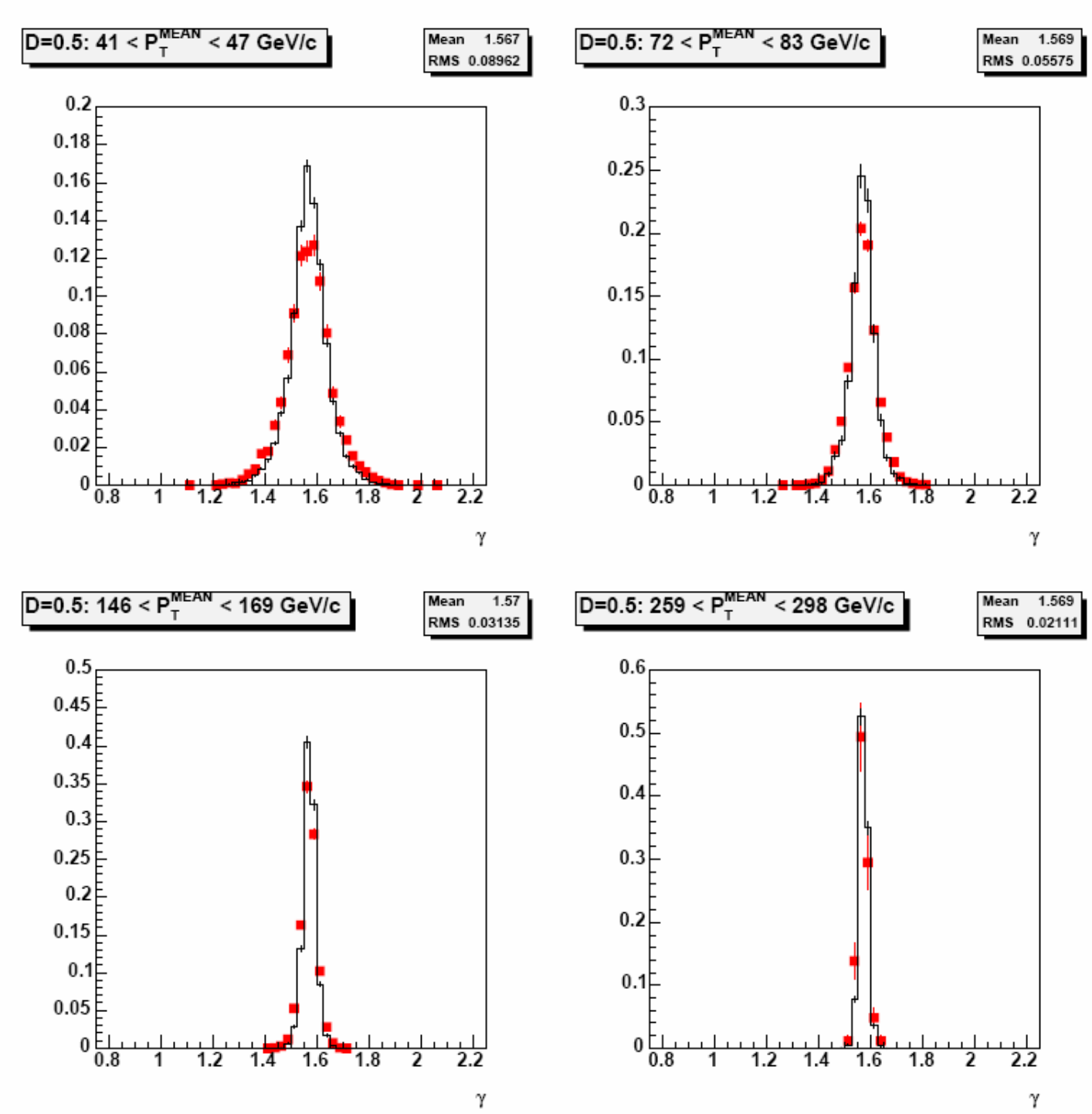
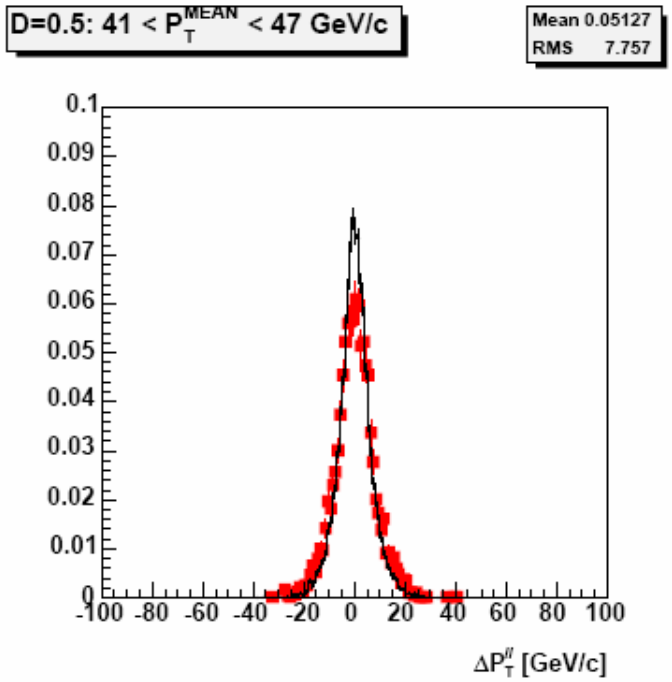
Outline

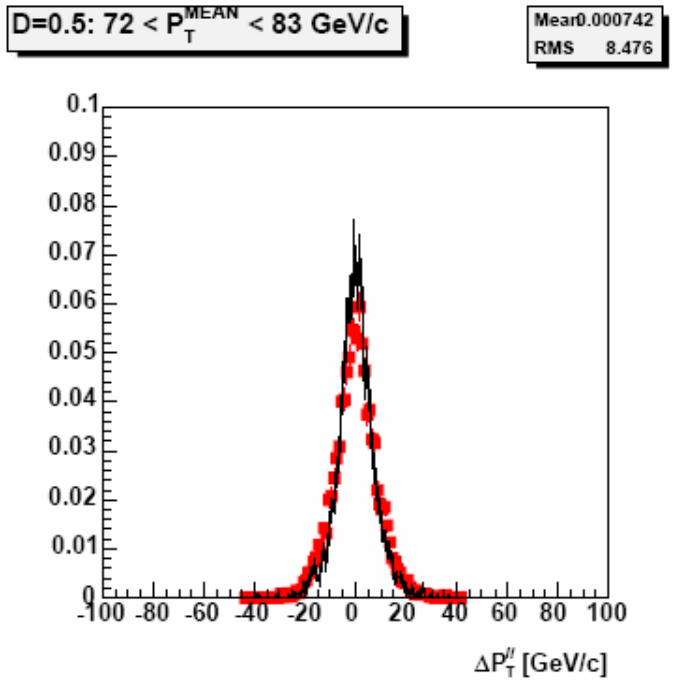
- Remark: most plots here are only for D=0.5
  - Plots are similar for D=0.7 and 1.0 (see GP web page)
- Bisector Method
  - Raw quantity distributions (Data and MC) → pages 2 to 4
  - Applied at hadron level → page 5
- Dijet Balance
  - Raw quantity distributions (Data and MC) → pages 6 to 10
  - Probe Jet / $|\eta_{DET}| < 0.25$ (> 0.55) → page 11
  - Probe Jet / $|\eta_{DET}| \notin [0.25,0.55]$ (reference region) → page 12
- Rapidity distributions
  - Discrepancy between data and MC can be explained by above dijet balance results
  - Possible effect: compare unfolded cross sections with the nominal $0.1 < |Y^{CAL}| < 0.7$ cut and a $0.25 < |\eta_{DET}^{(CAL)}| < 0.55$ cut → page 13
- Absolute P_T jet correction
  - CAL / HAD matching distributions → pages 14 to 16
  - P_T and ΔP_T distributions → pages 17 to 19
- Pile-Up correction
  - Investigate cross sections in 5 ≠ run ranges → pages 20 and 21
- Systematic uncertainties
  - New JES uncertainty: now use curve (function of jet P_T) provided by the JER Group → between 2 and 3% instead of the flat 3% used previously: see page 22
  - Justify that the MC reproduce the Missing E_T scale at least at a ±10% level → page 23

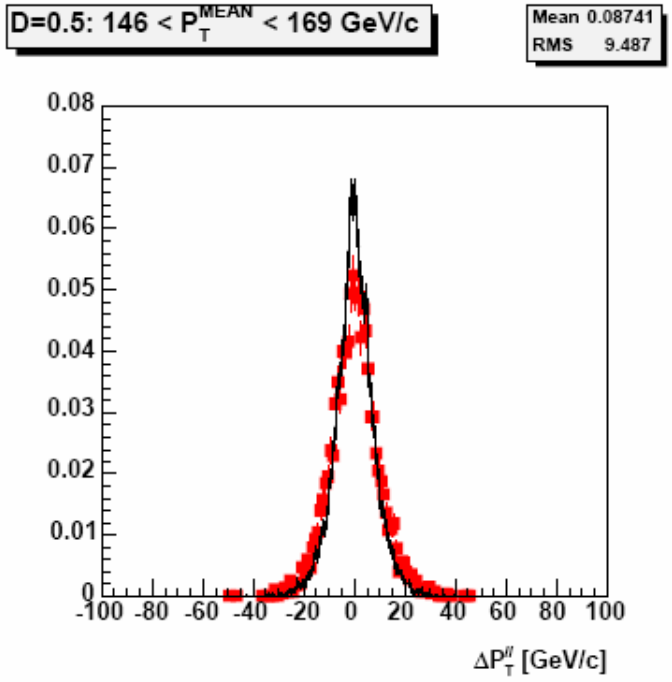
Bisector Method: angle γ

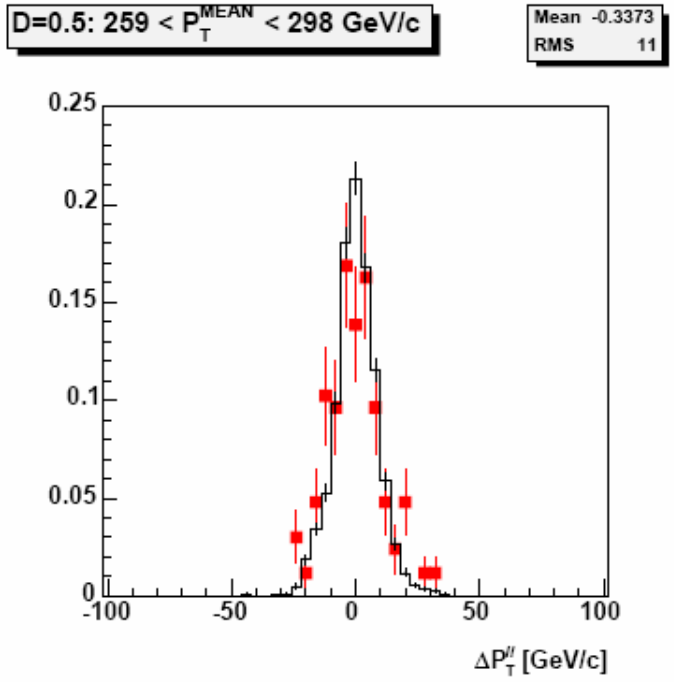


Bisector Method: $\Delta P_T^{//}$

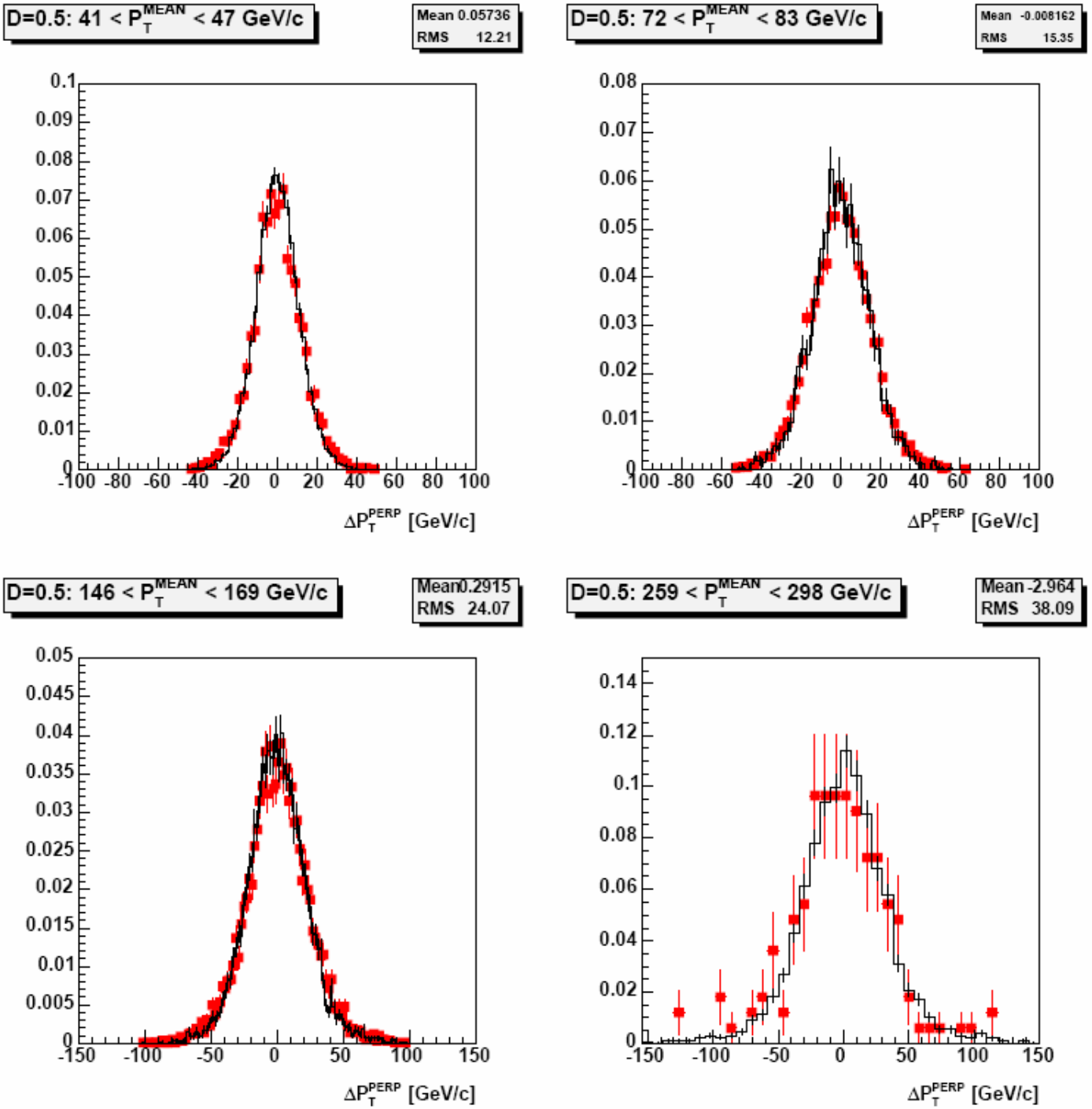




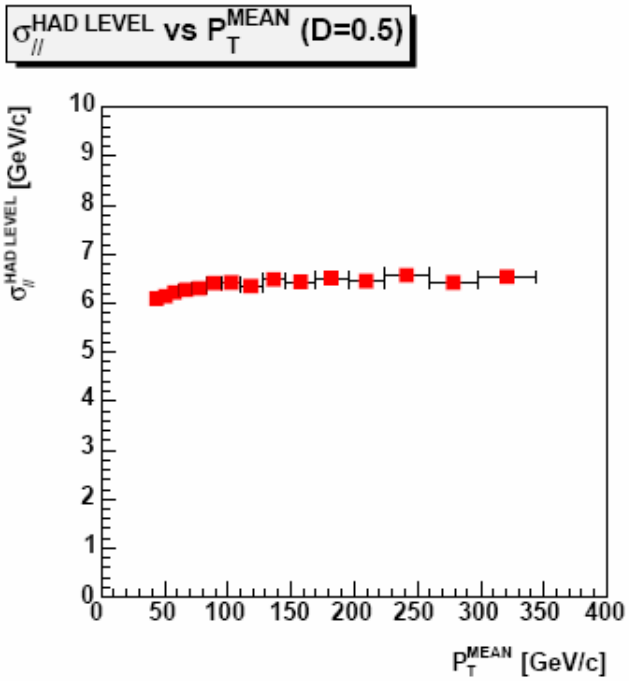


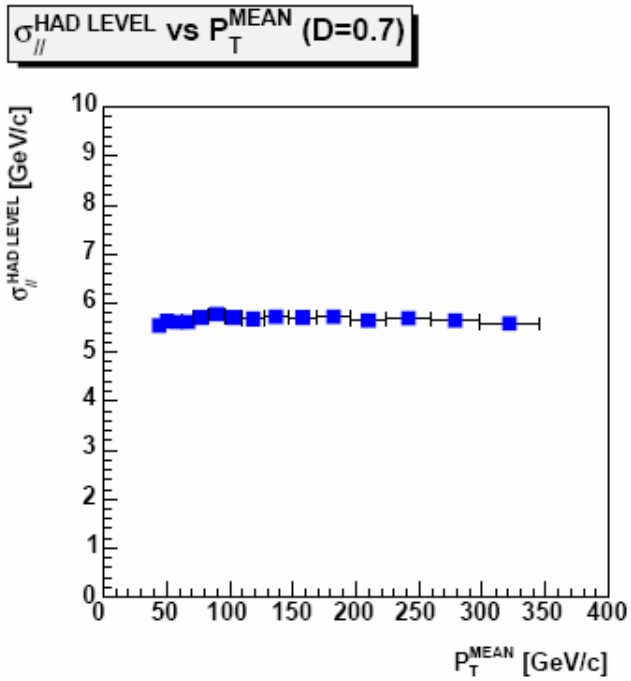


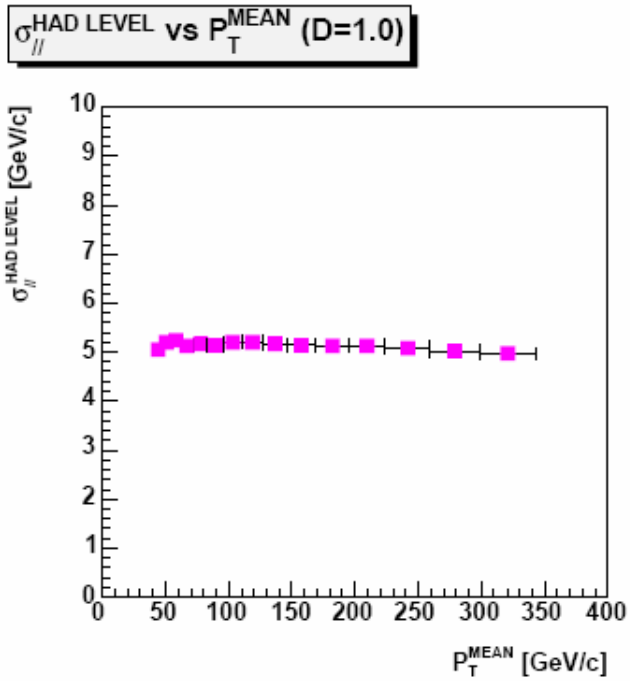
Bisector Method: ΔP_T^{PERP}

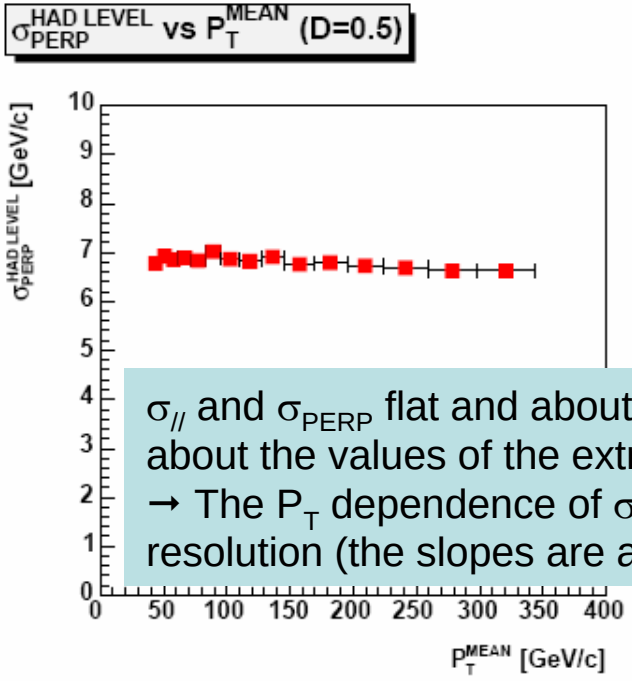


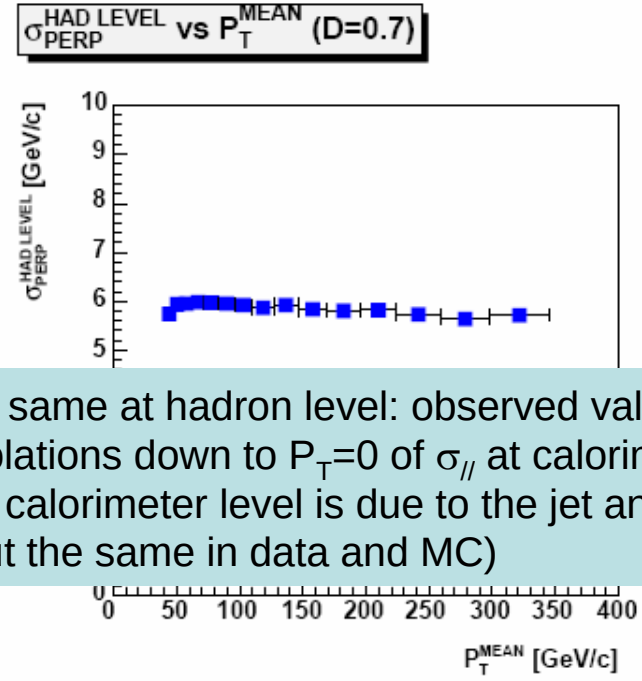
Bisector Method at Hadron Level

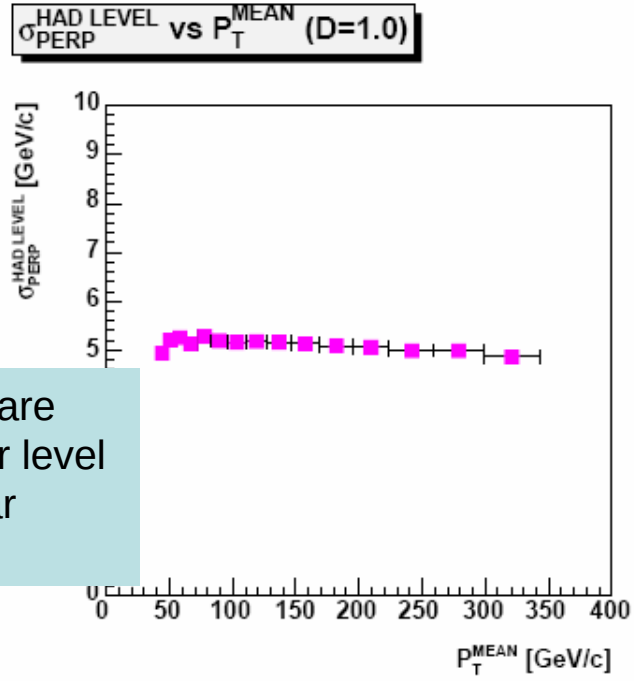








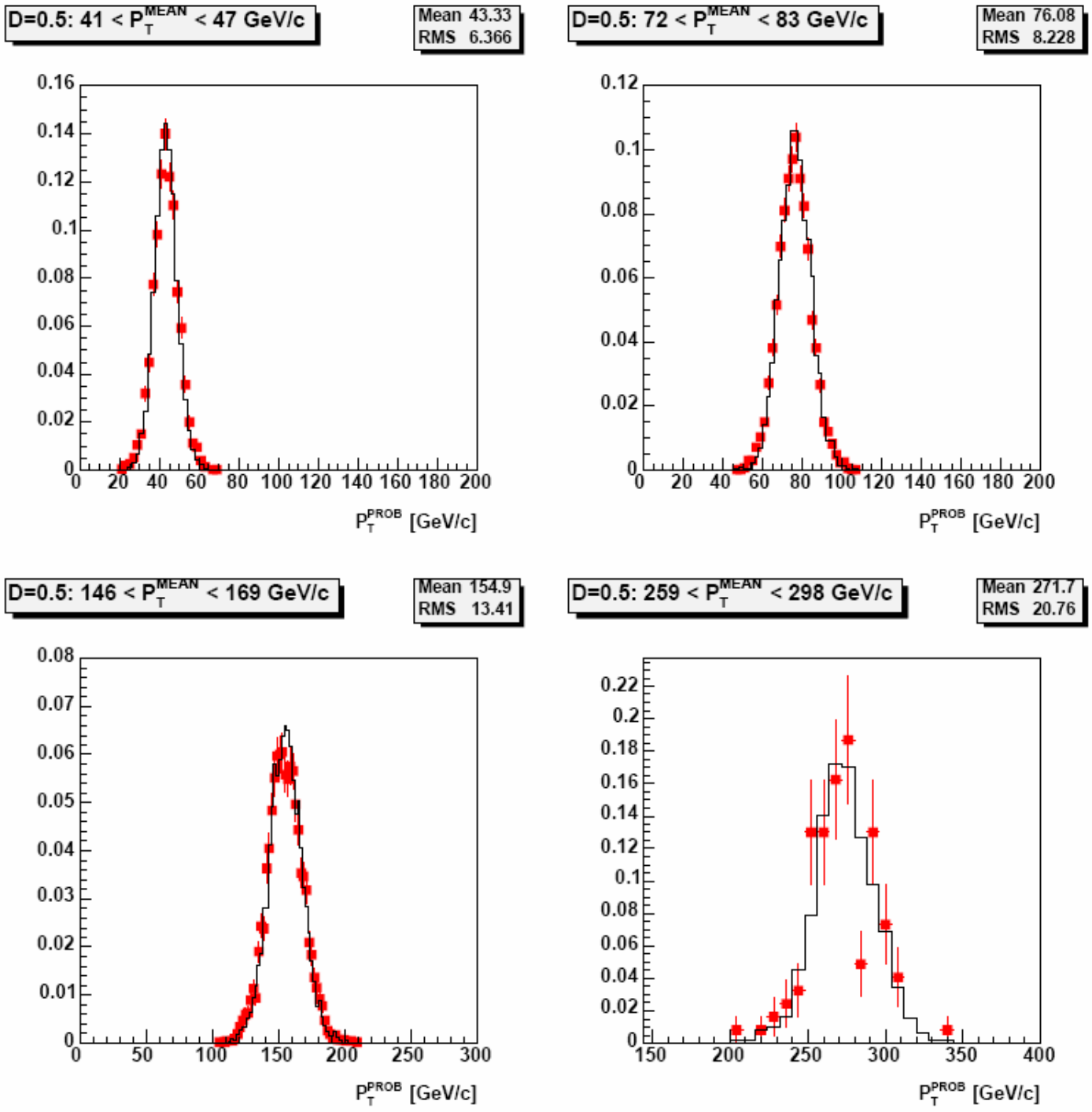




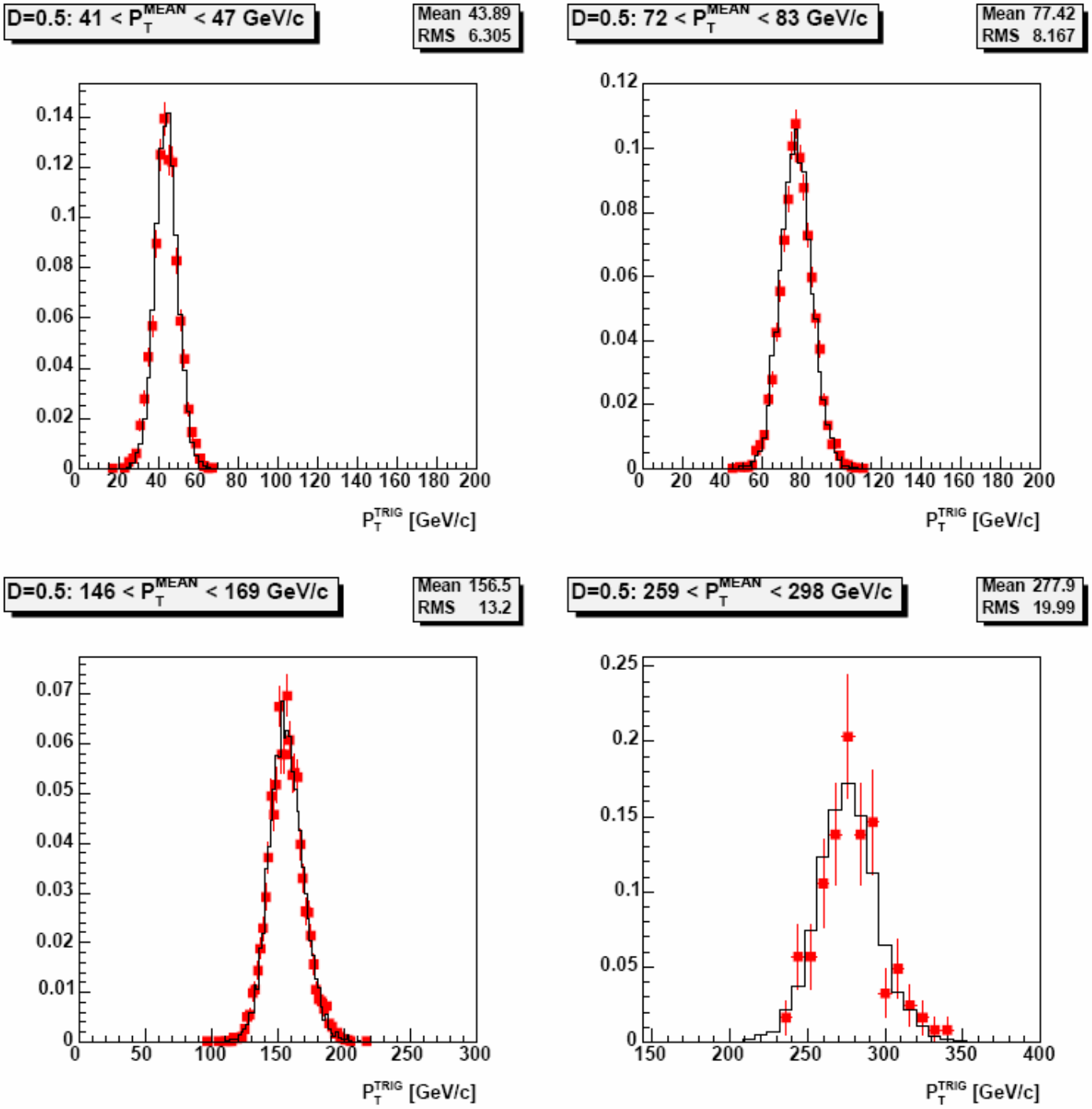
$\sigma_{//}$ and σ_{PERP} flat and about the same at hadron level: observed values are about the values of the extrapolations down to P_T=0 of $\sigma_{//}$ at calorimeter level

→ The P_T dependence of $\sigma_{//}$ at calorimeter level is due to the jet angular resolution (the slopes are about the same in data and MC)

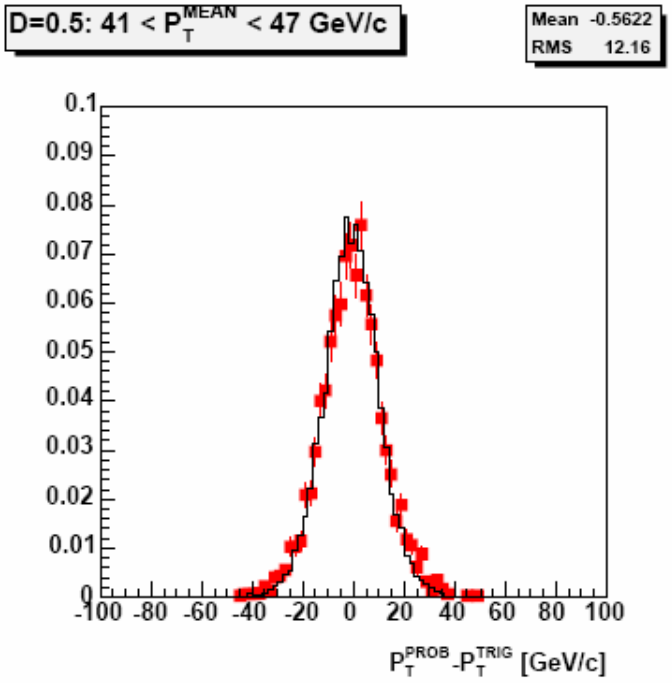
Dijet Balance: P_T^{PROB}

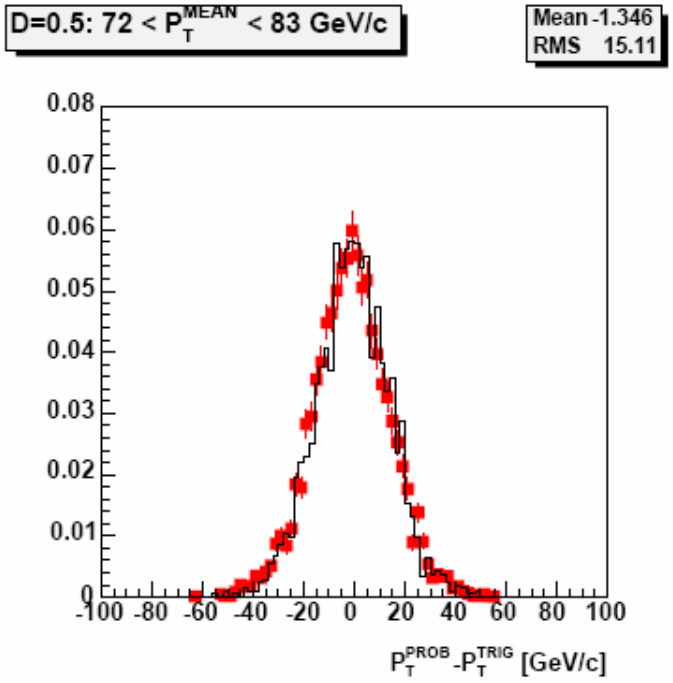


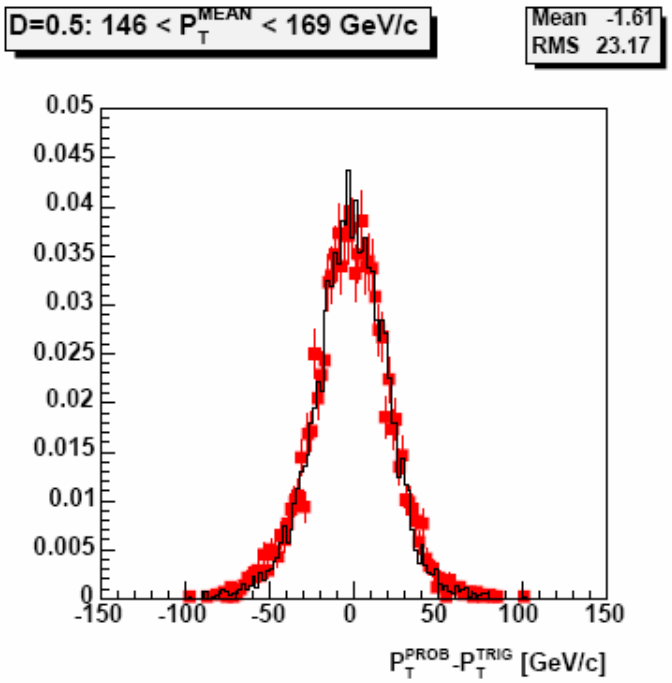
Dijet Balance: P_T^{TRIG}

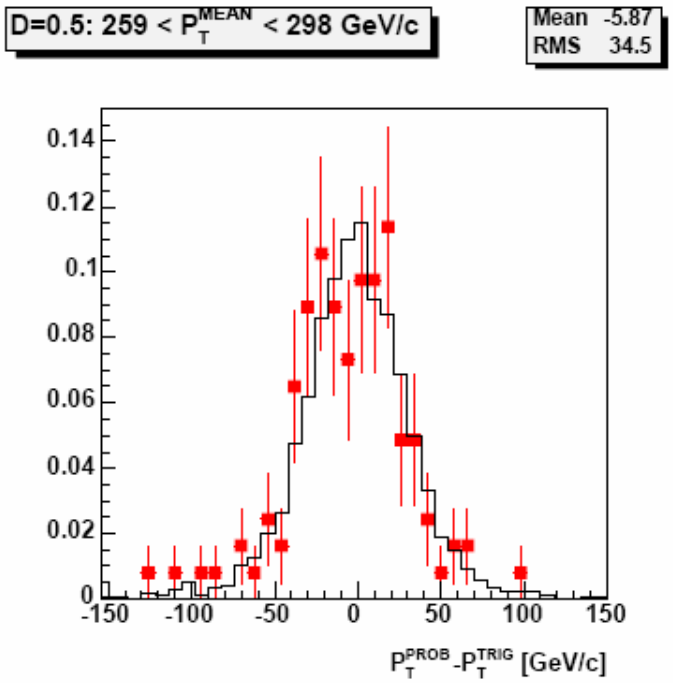


Dijet Balance: $P_T^{PROB} - P_T^{TRIG}$

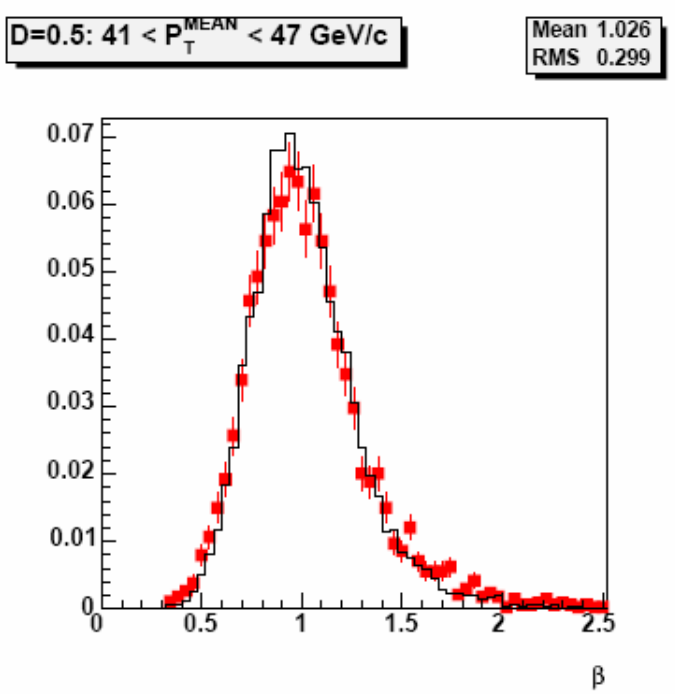


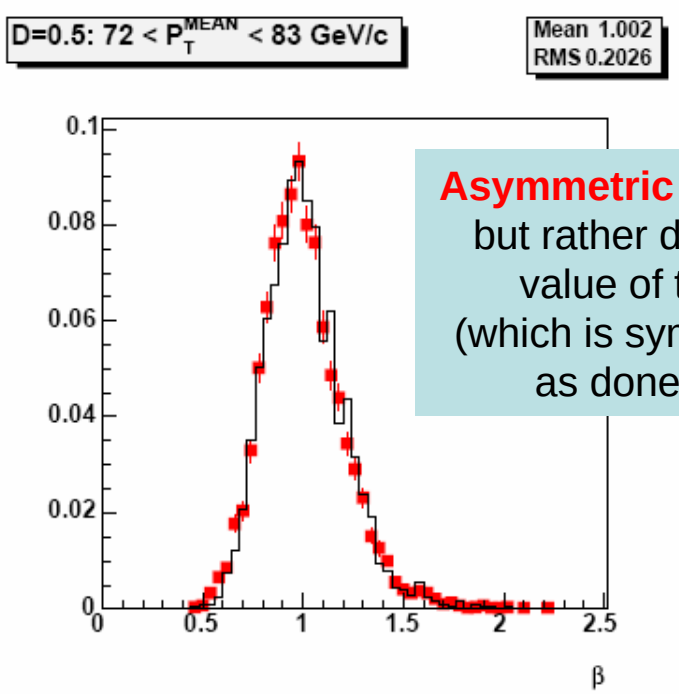




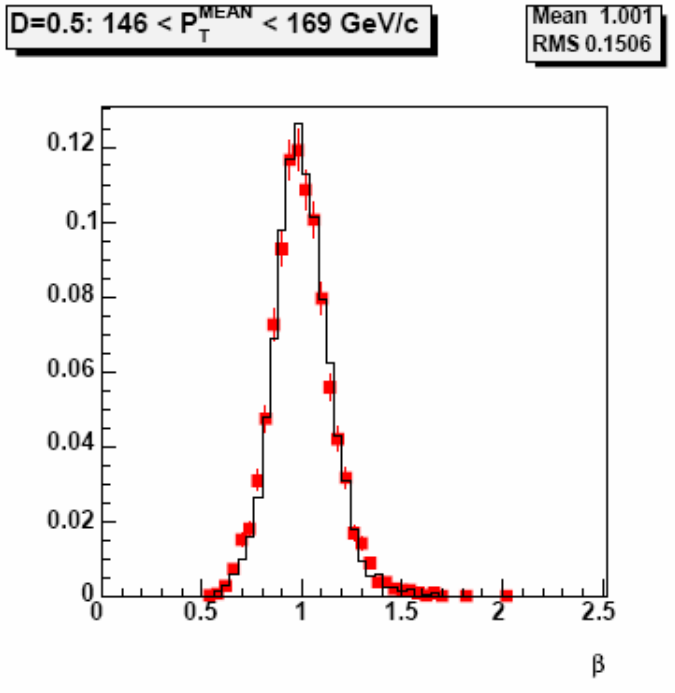


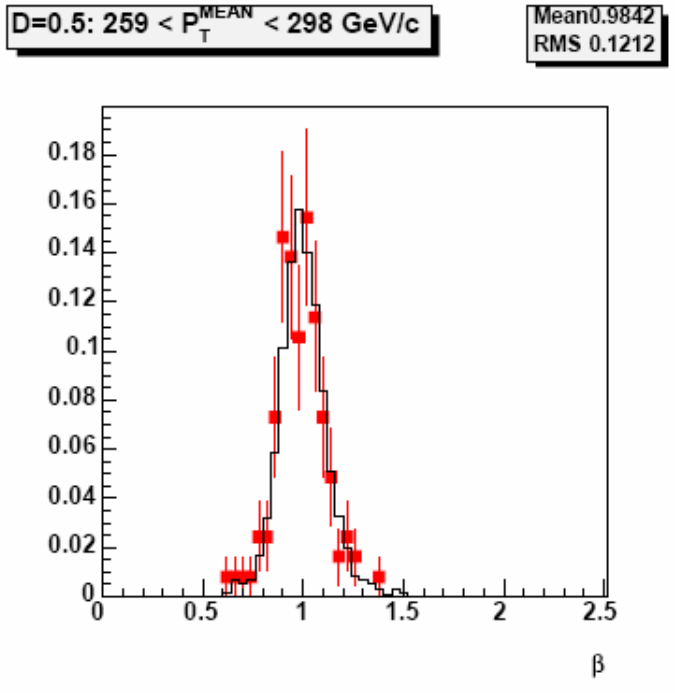
Dijet Balance: β distribution



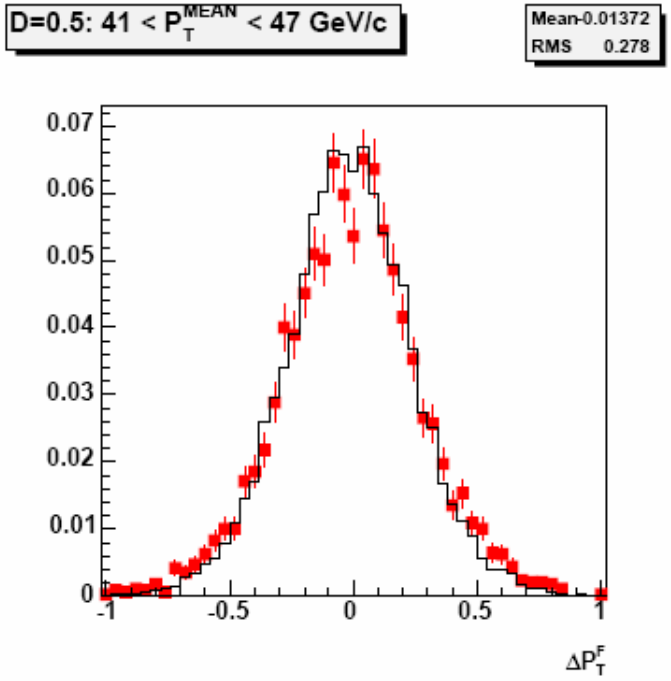


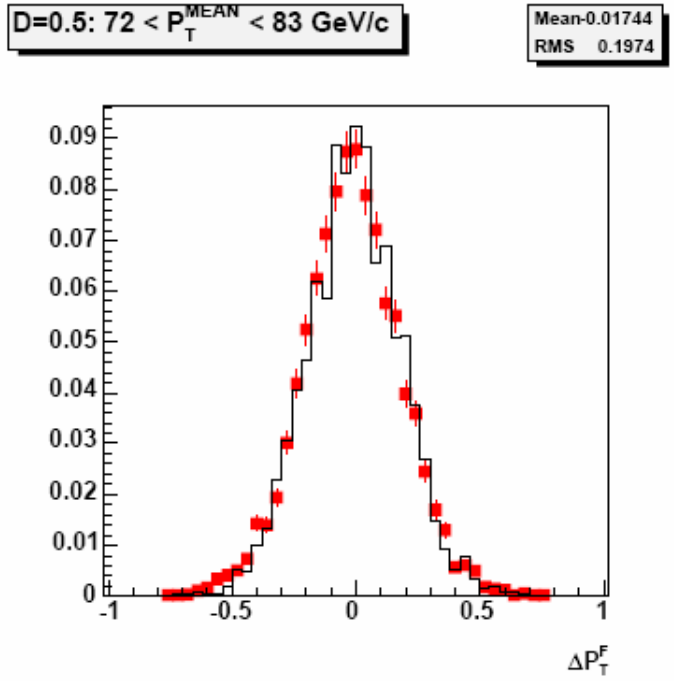
Asymmetric tail → we don't use that but rather define β from the mean value of the ΔP_T^F distribution (which is symmetric, see next slide) as done by the JER Group

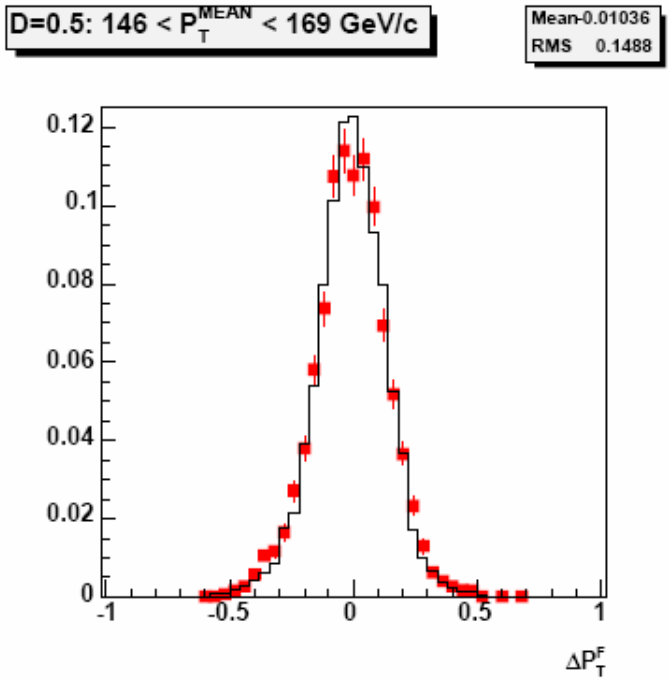


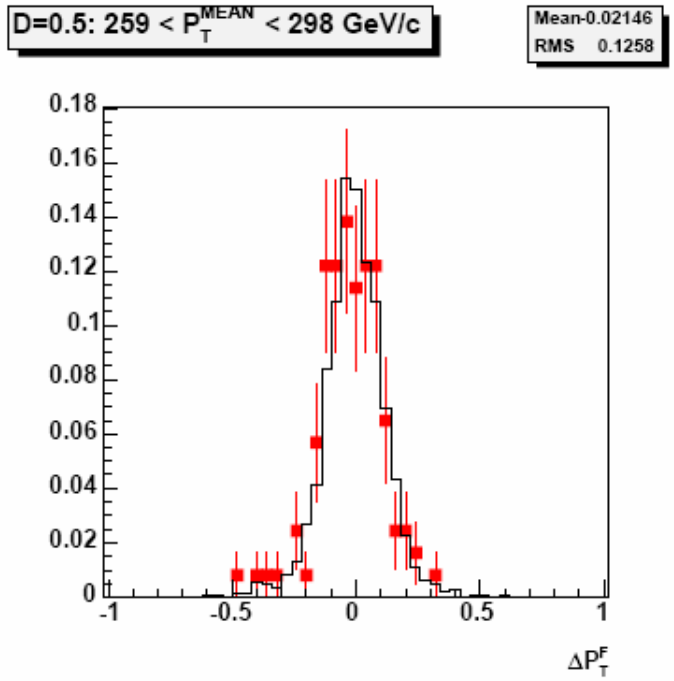


Dijet Balance: ΔP_T^F

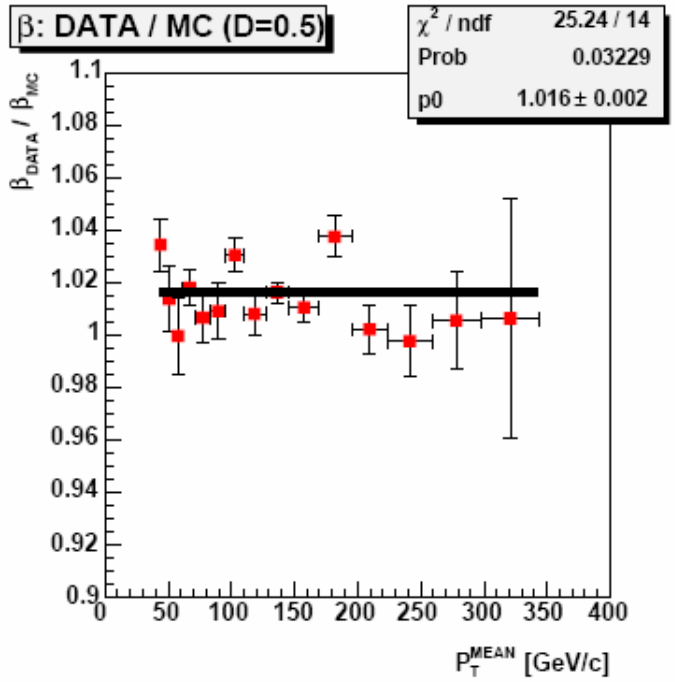


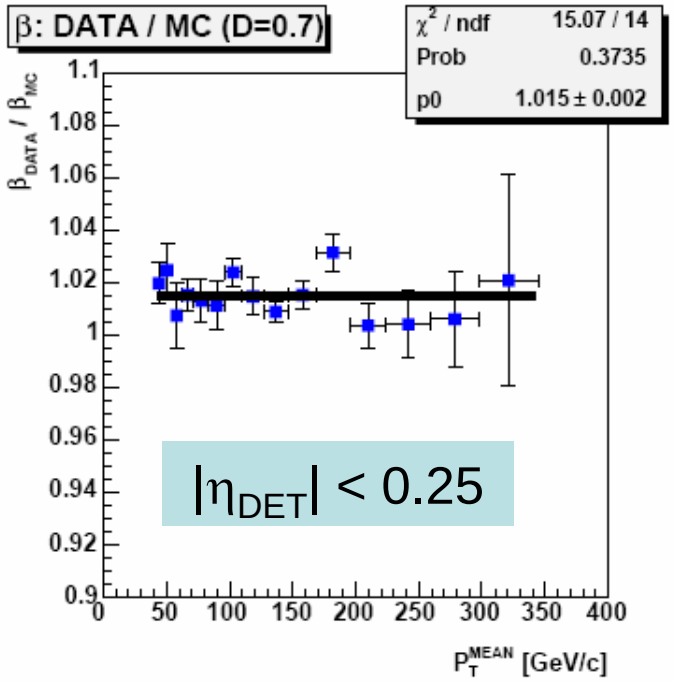


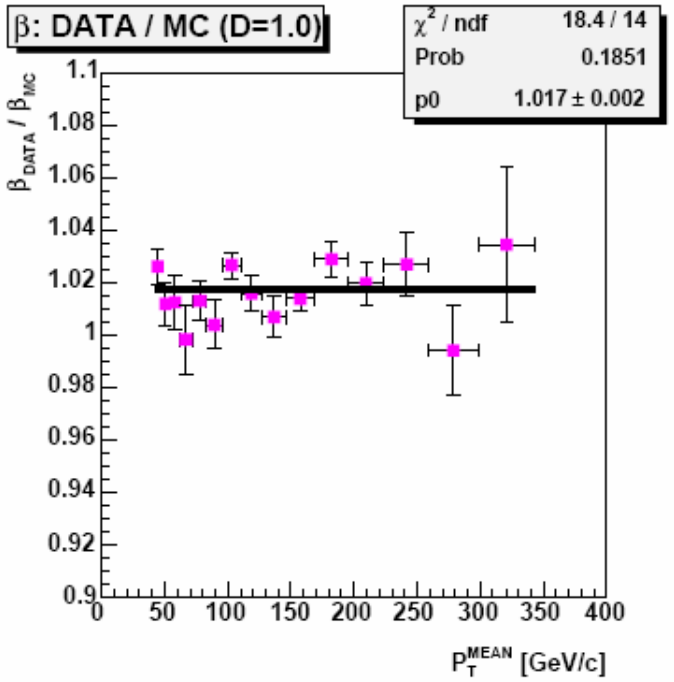


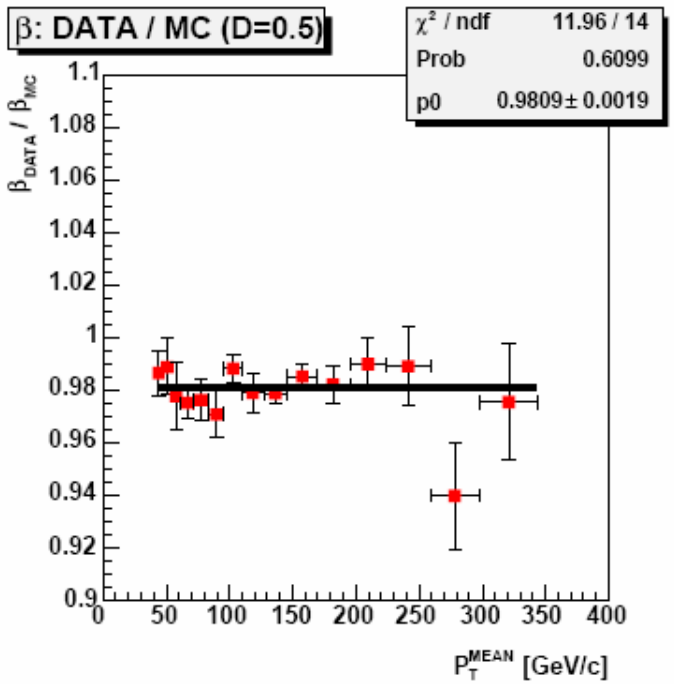


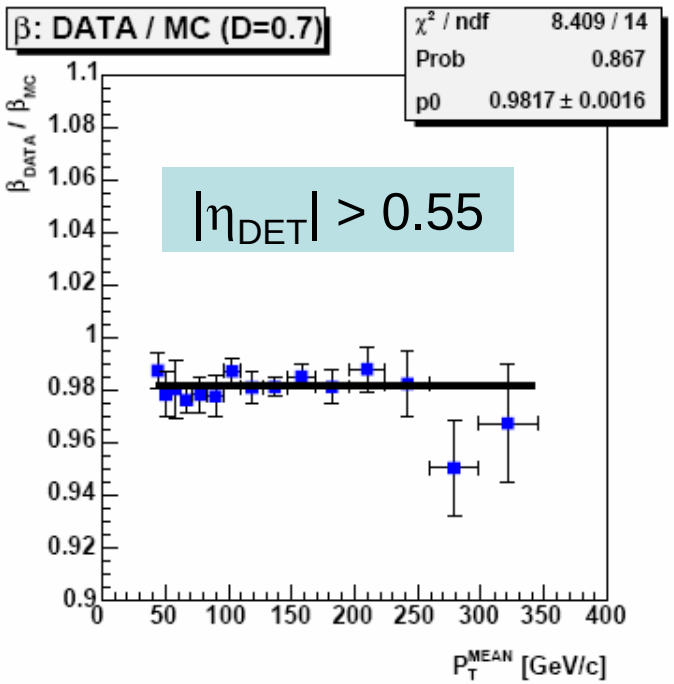
Dijet Balance: Probe Jet / $|\eta_{DET}| < 0.25$ (> 0.55)

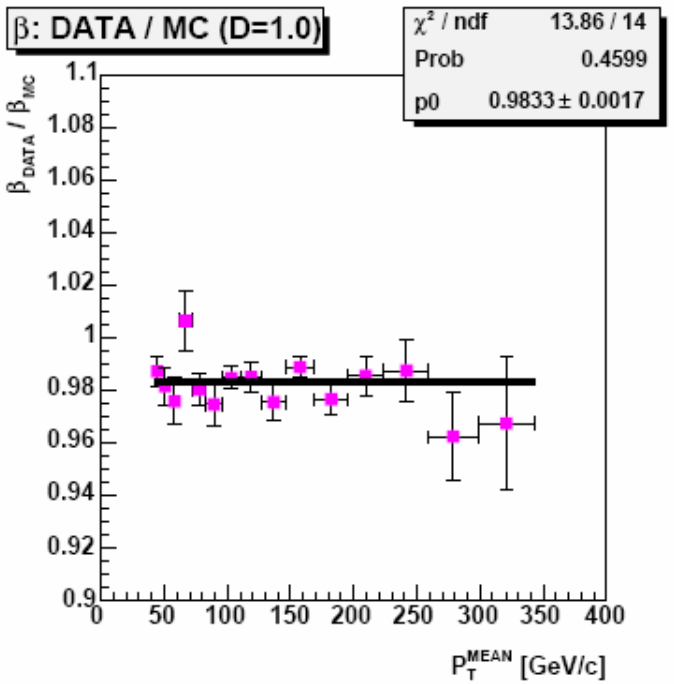




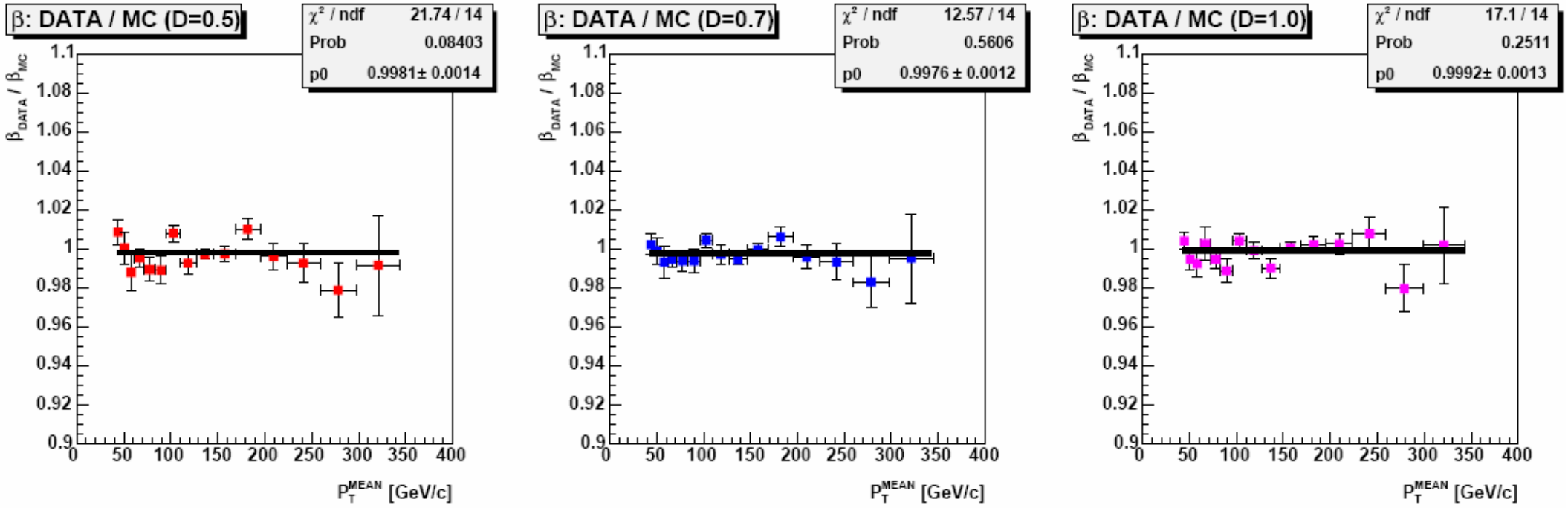








Dijet Balance: Probe Jet / $|\eta_{DET}| \notin [0.25,0.55]$



- $|\eta_{DET}| < 0.25$ (> 0.55)

→ Discrepancies between Data and MC are within the JES uncertainty

  – Discrepancies in opposite directions for $|\eta_{DET}| < 0.25$ and $|\eta_{DET}| > 0.55$

  – Explain discrepancy between data and MC concerning the rapidity distributions

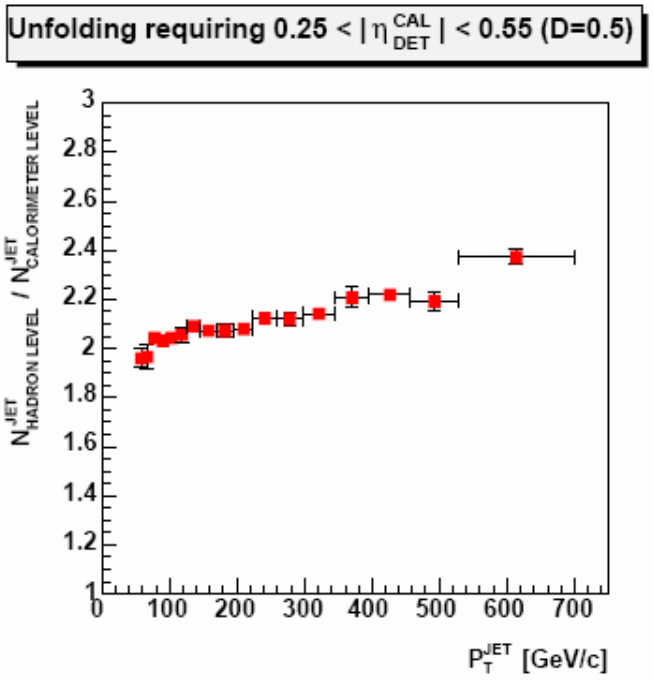
- Probe jet / $0.1 < |Y| < 0.7$ && $|\eta_{DET}| \notin [0.25,0.55]$

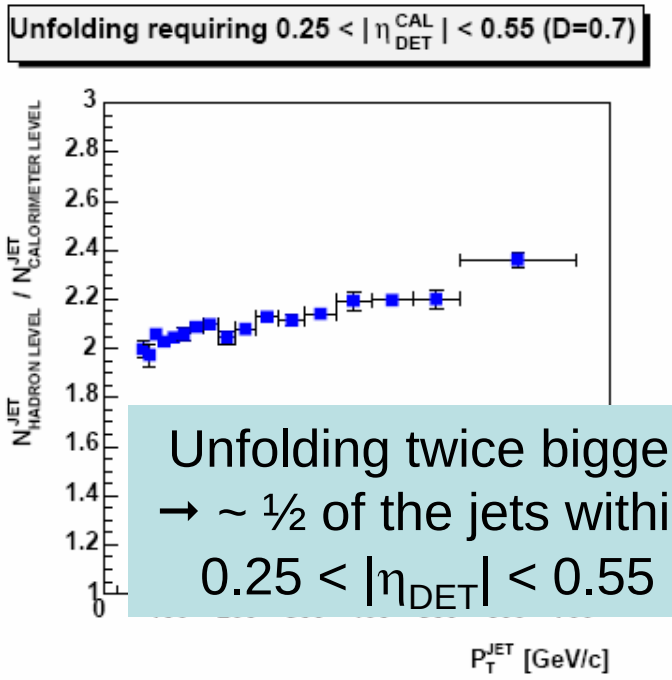
→ Dijet Balance is globally OK

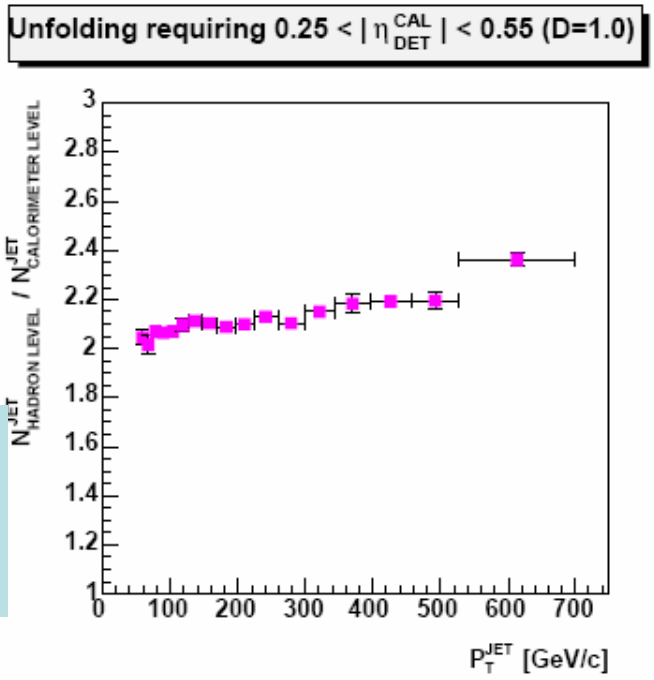
  – Discrepancies between Data and MC for $|\eta_{DET}| < 0.25$ on one hand and $|\eta_{DET}| > 0.55$ on the other hand compensate here

  – What happens for the cross section: see next slide…

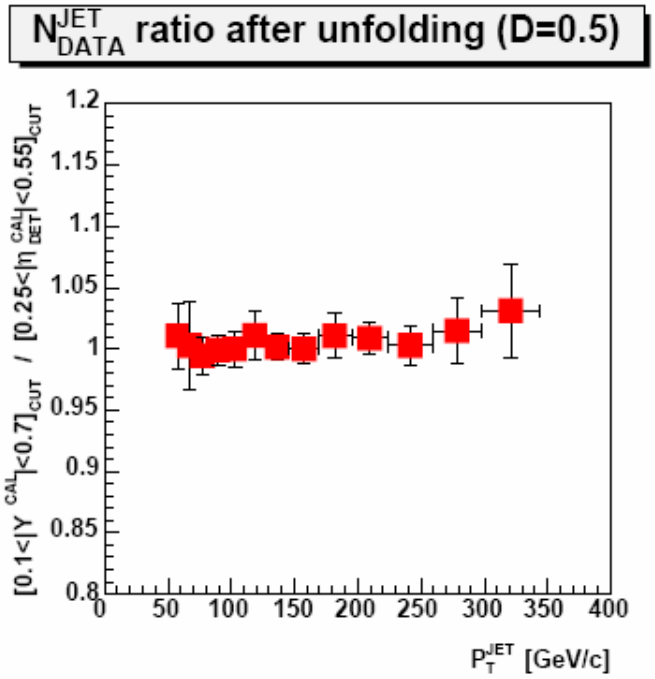
Unfolded σ → 0.1<|Y^{CAL}|<0.7 vs 0.25<|$\eta_{DET}^{(CAL)}$|<0.55

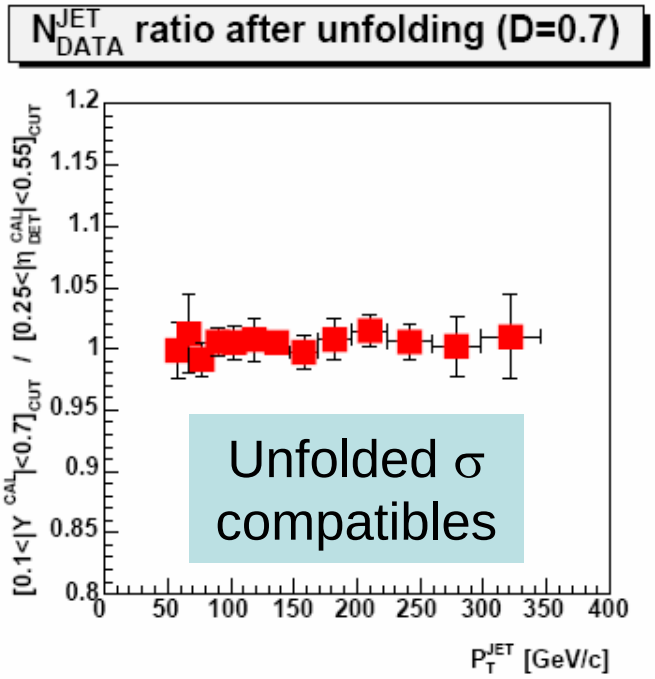




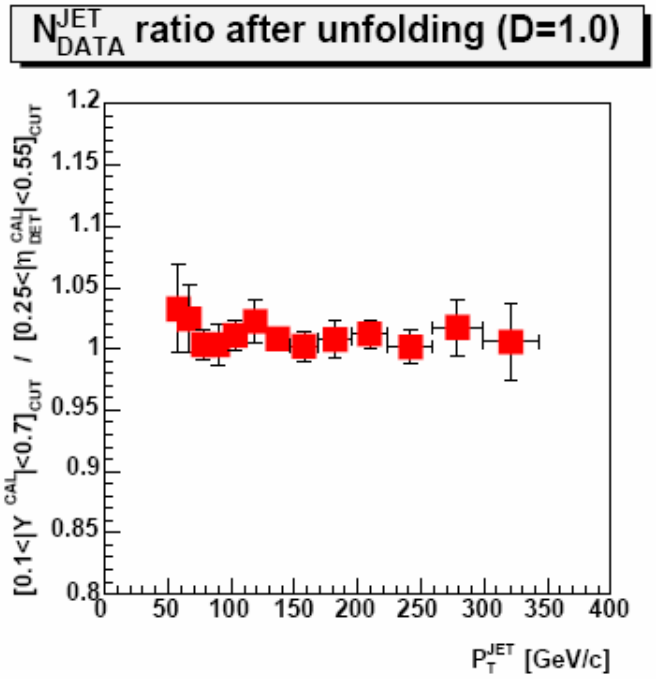


Unfolding twice bigger
→ ~ ½ of the jets within
0.25 < $|\eta_{DET}|$ < 0.55

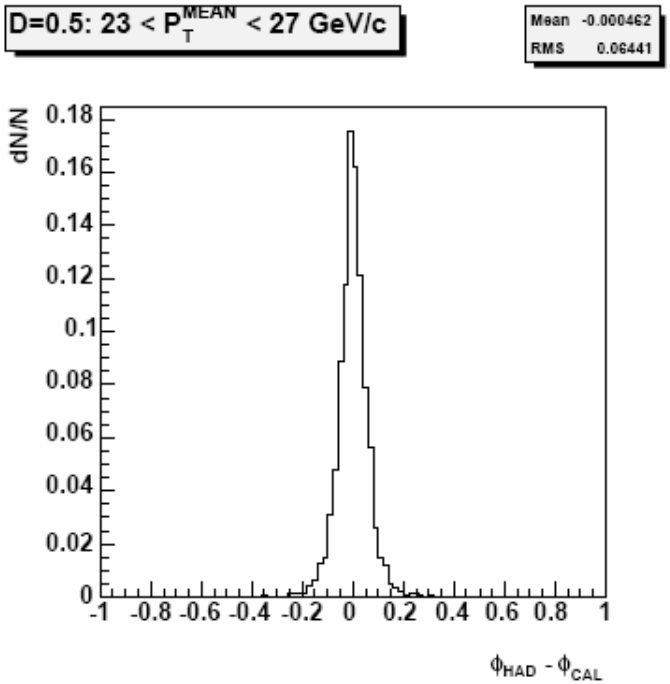


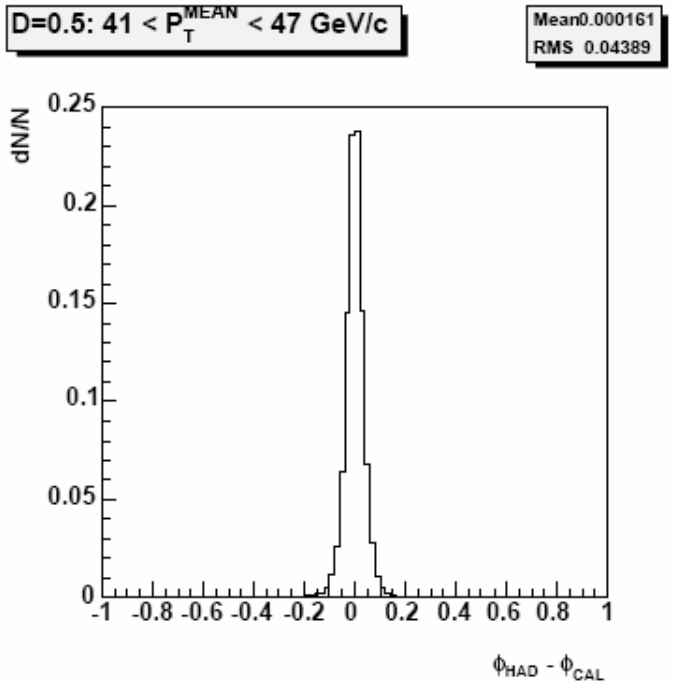


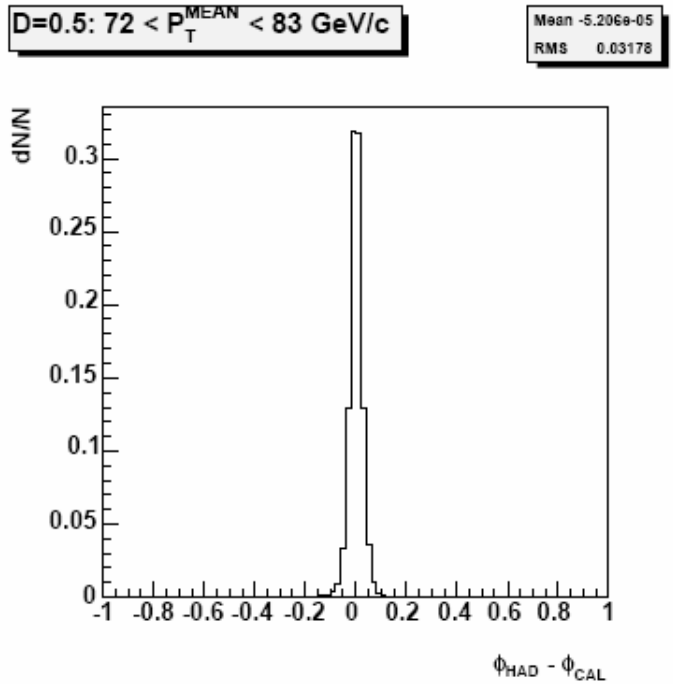
Unfolded σ
compatibles

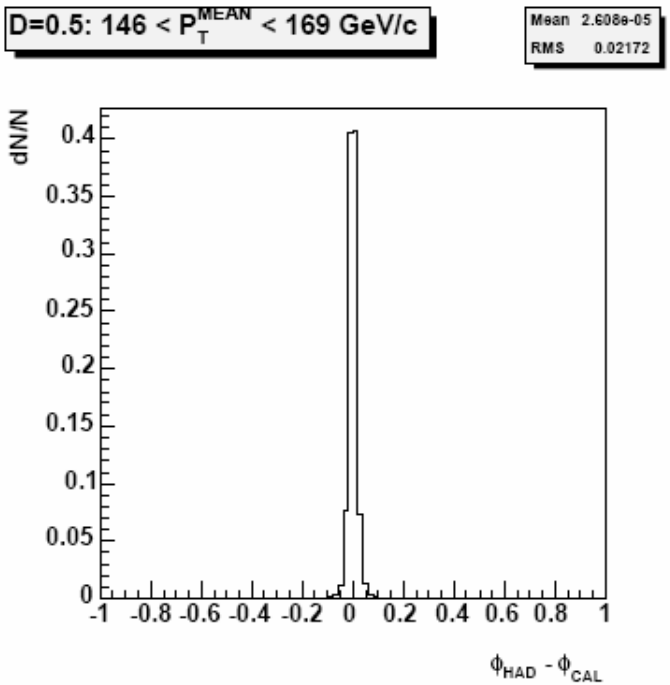


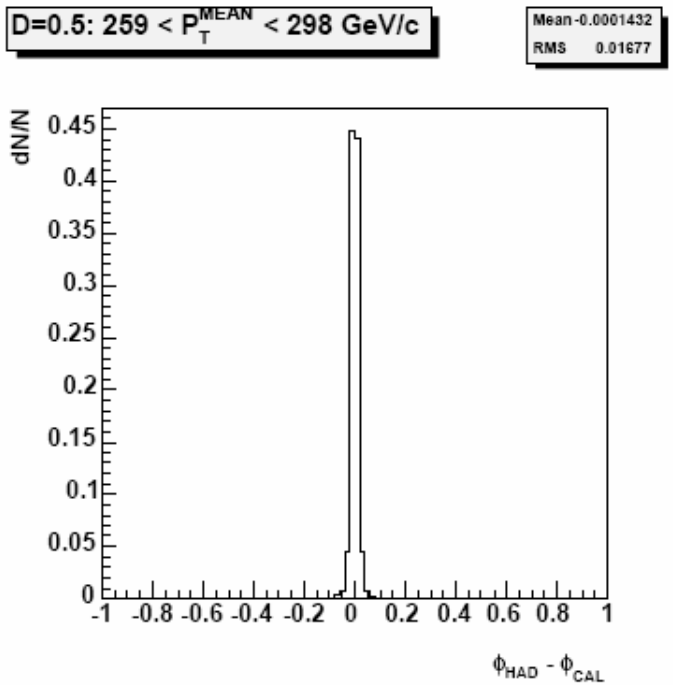
CAL / HAD matching: $\Delta\phi$

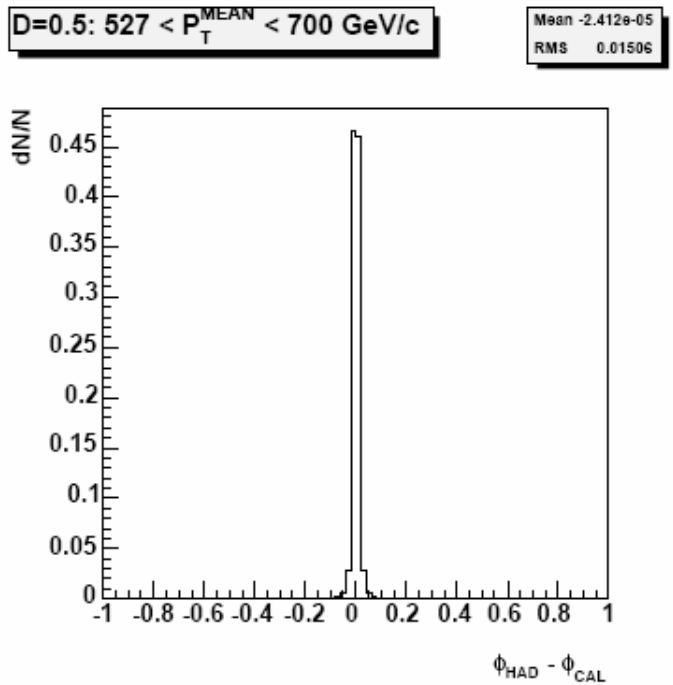




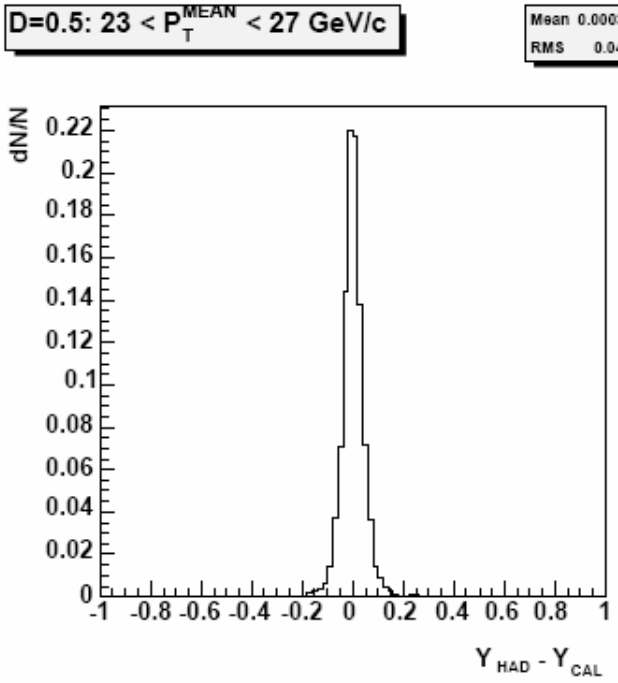


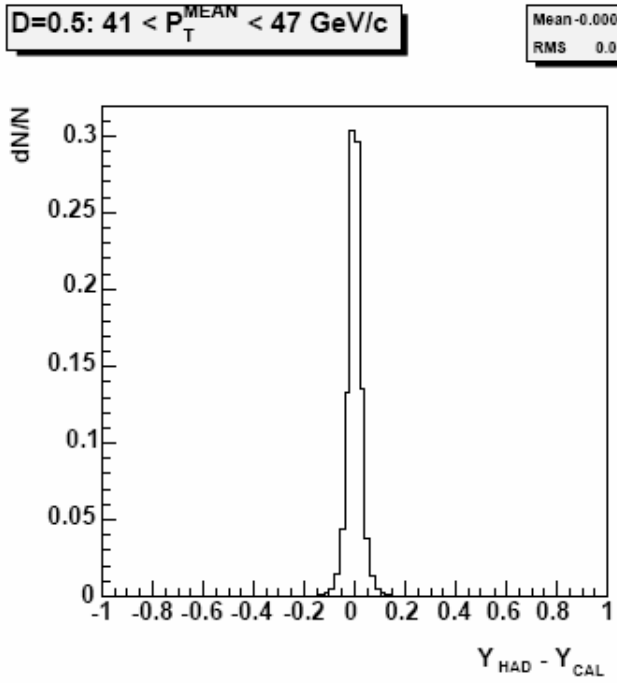


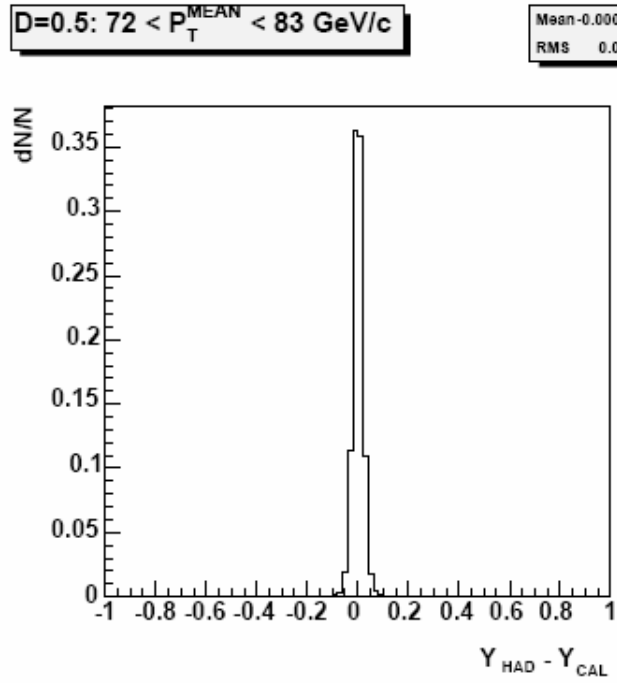


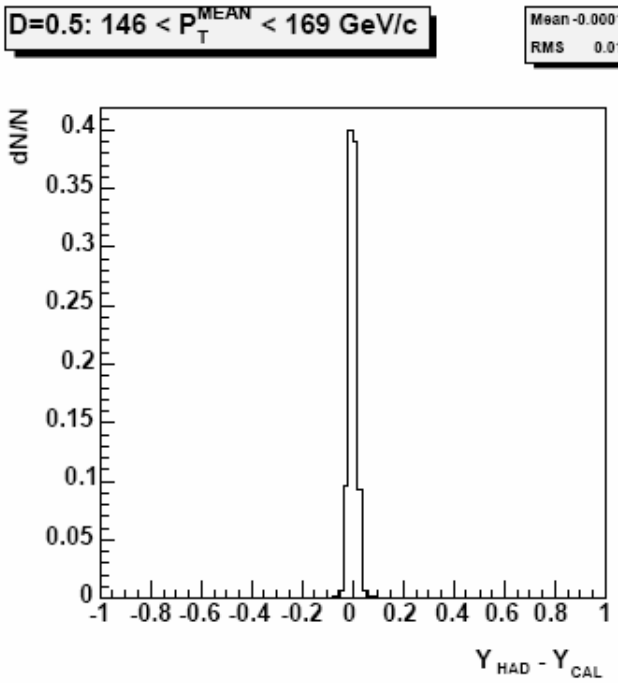


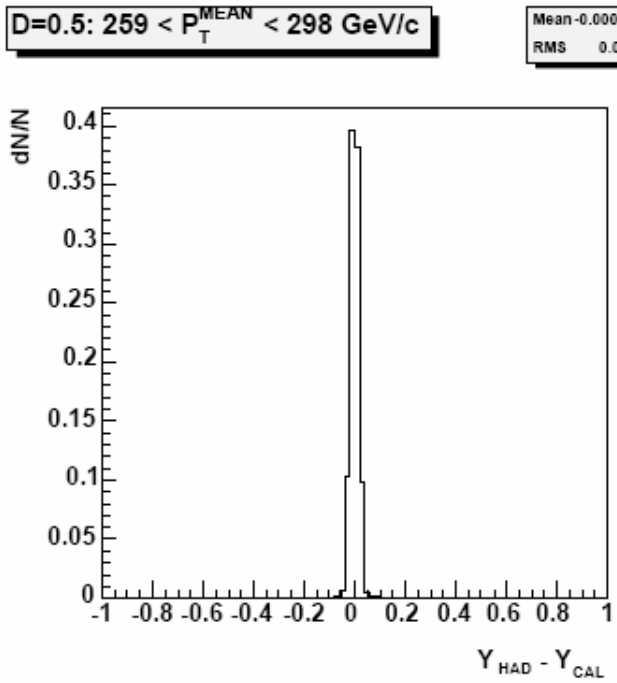
CAL / HAD matching: ΔY

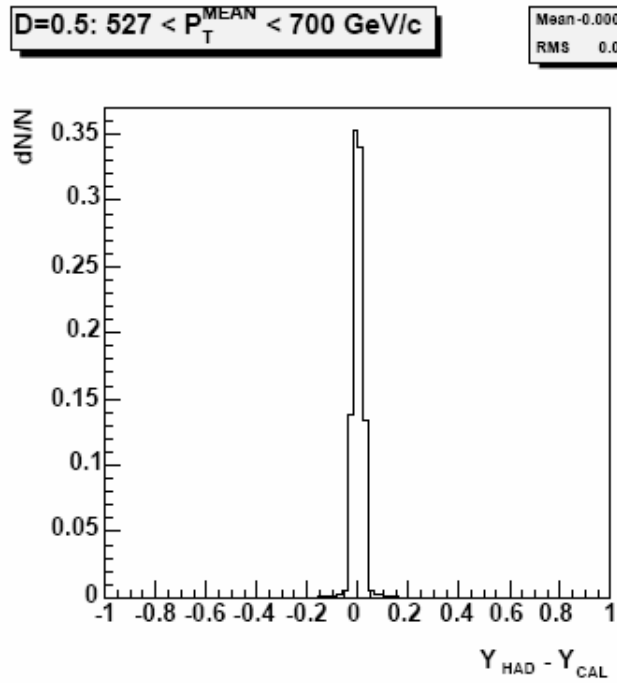




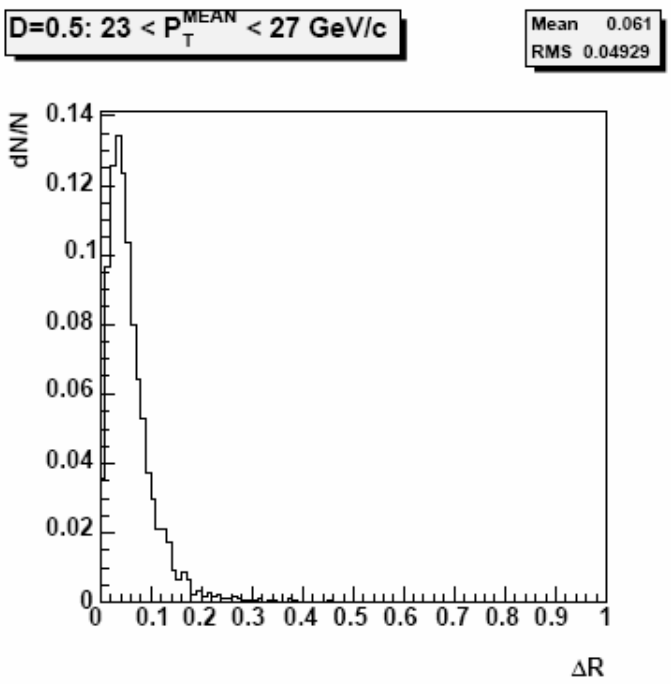


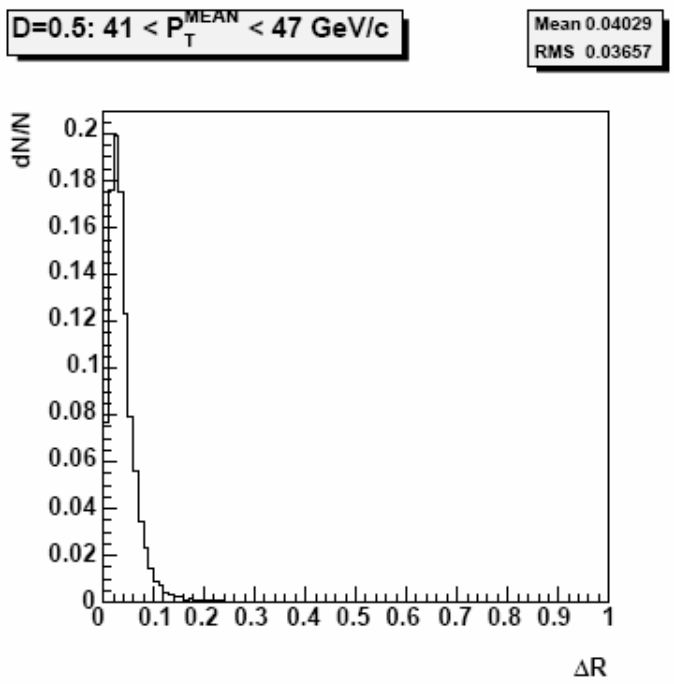


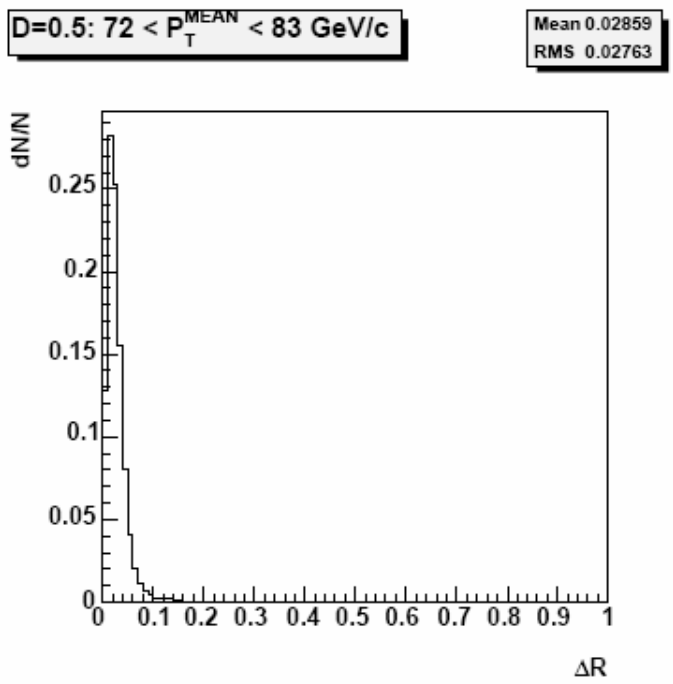


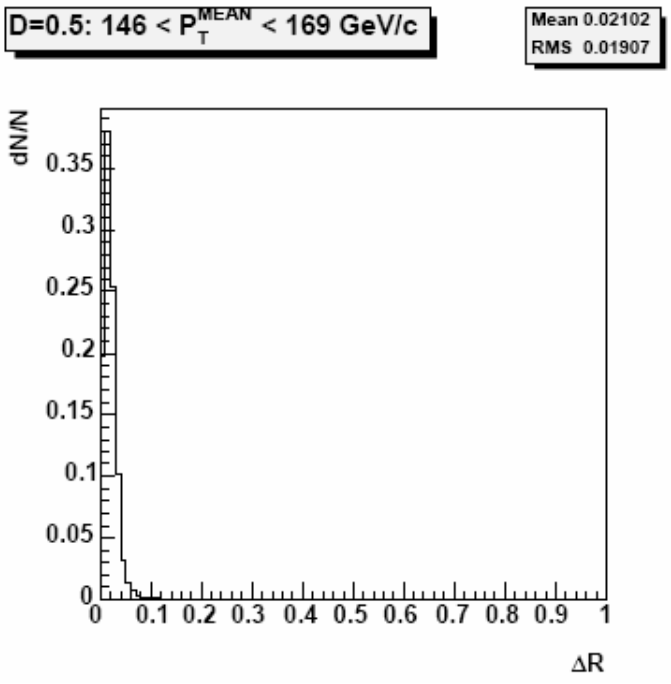


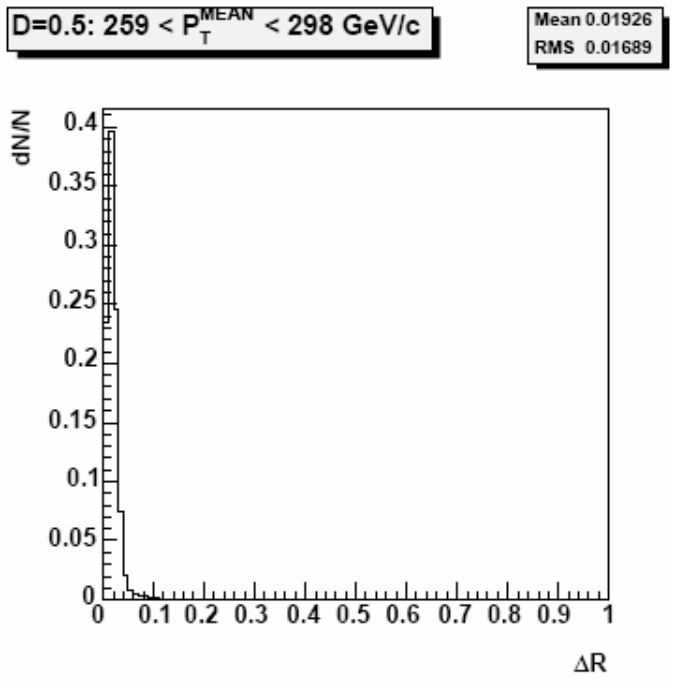
CAL / HAD matching: ΔR

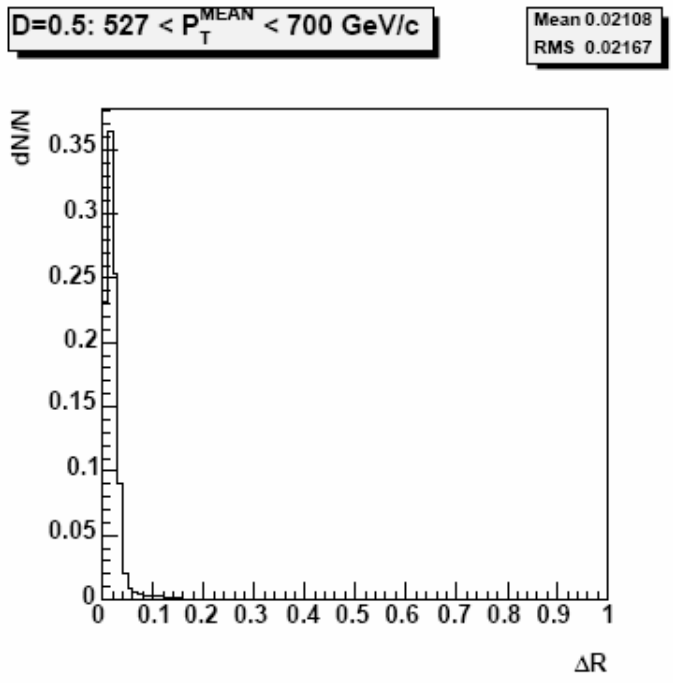




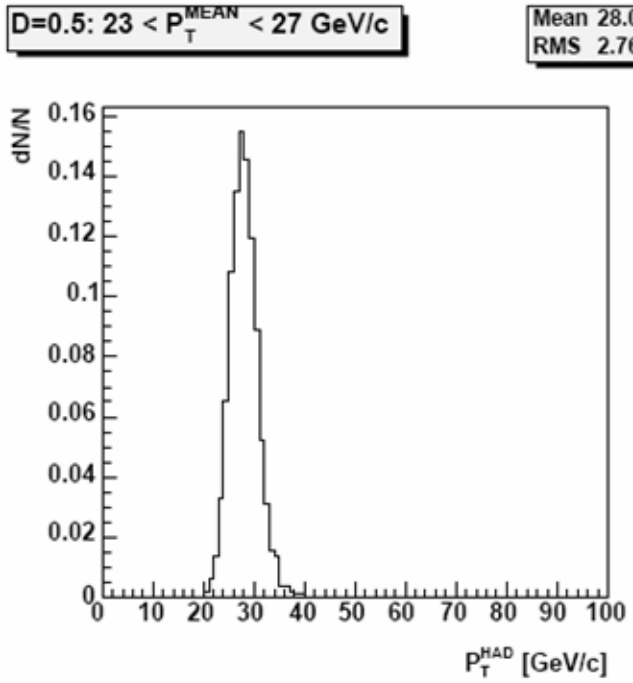


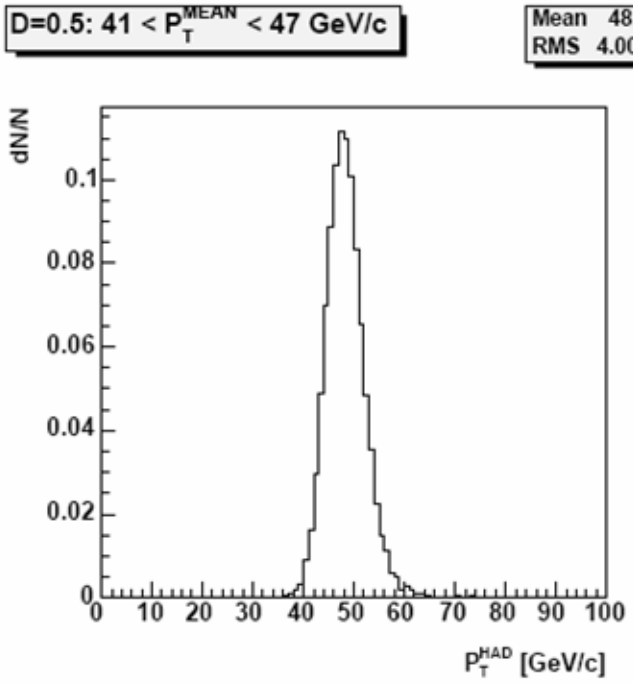


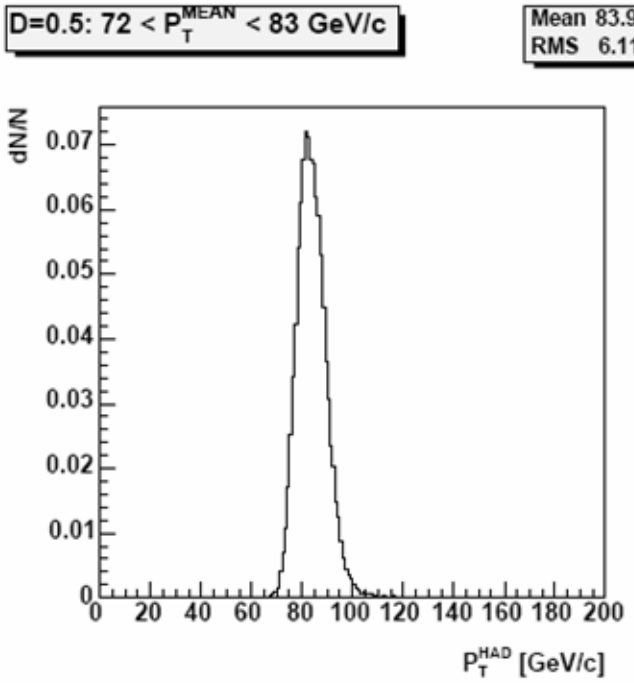


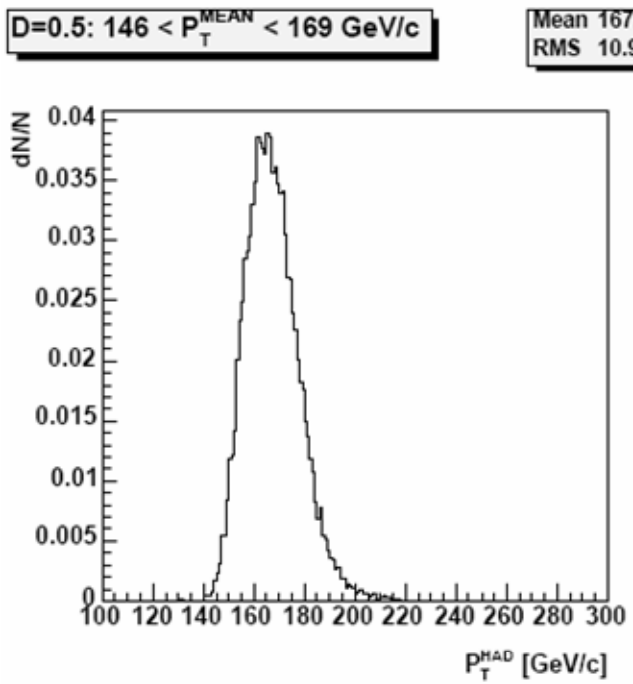


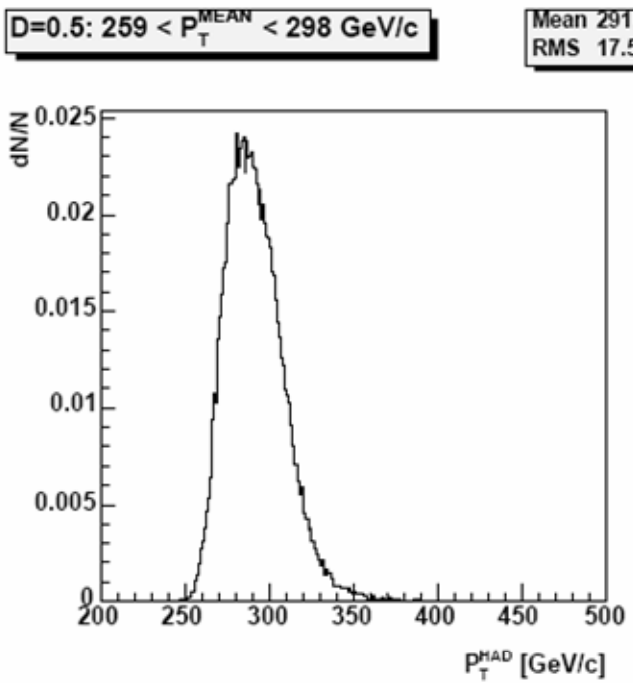
Absolute P_T jet correction: P_T^{HAD}

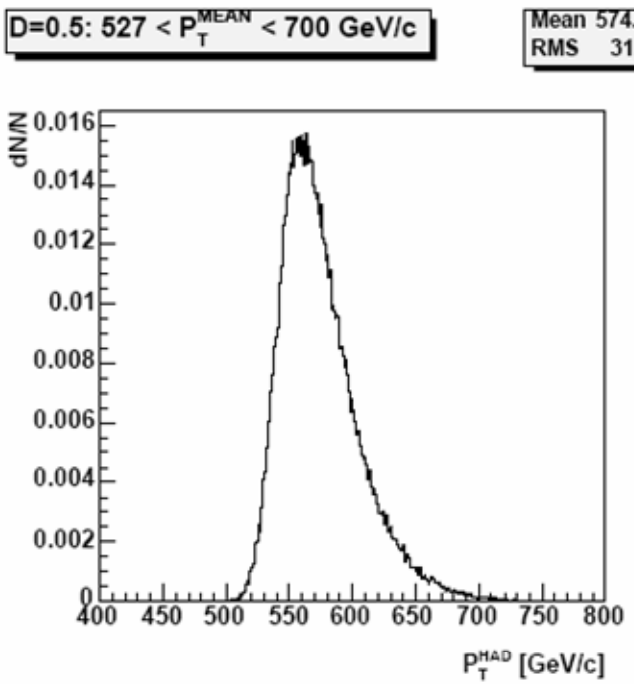




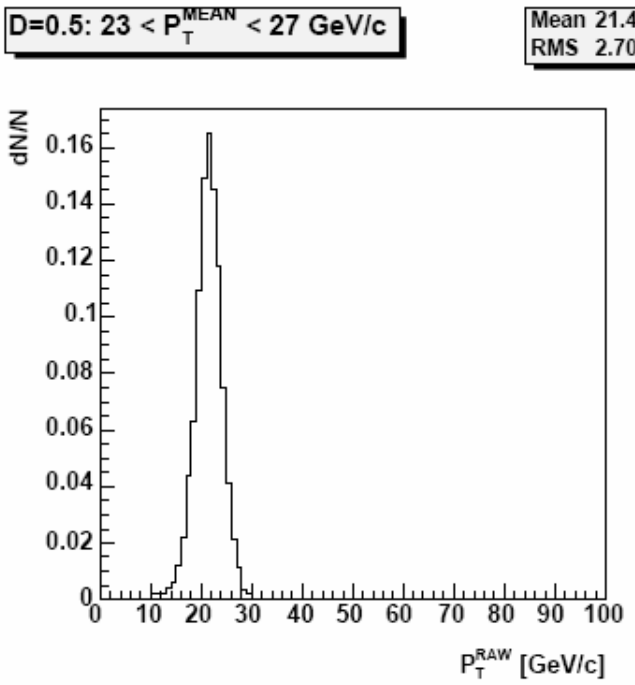


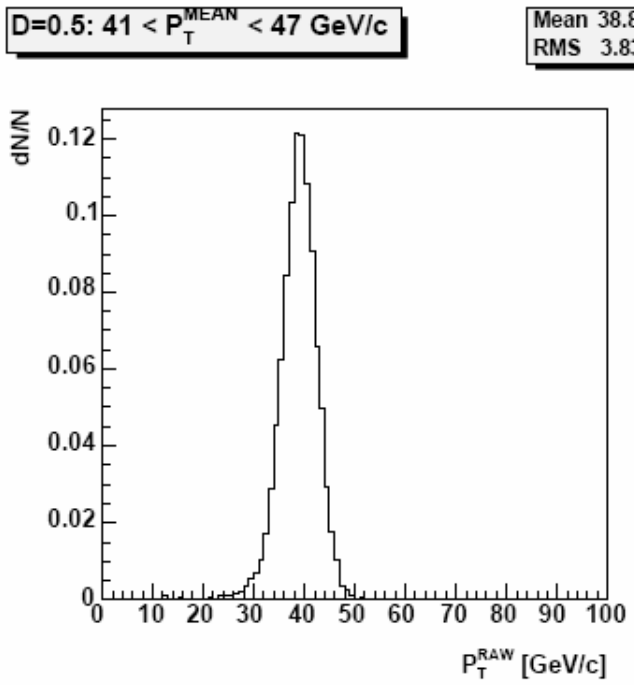


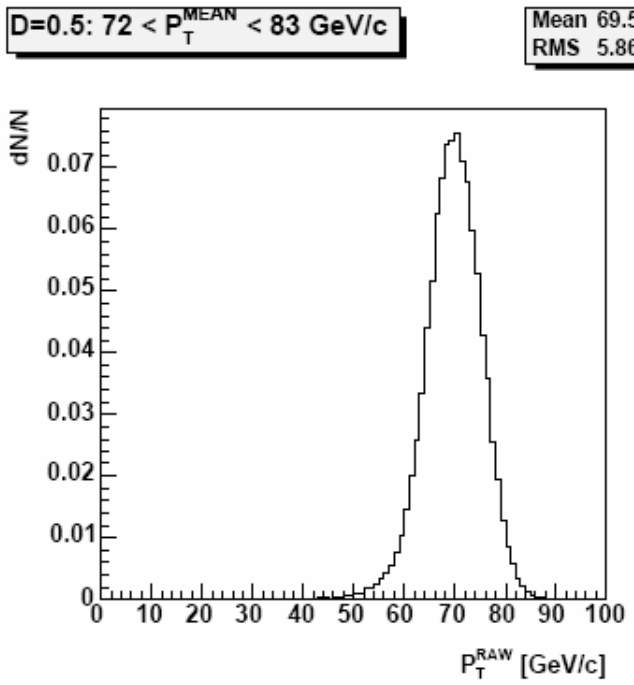


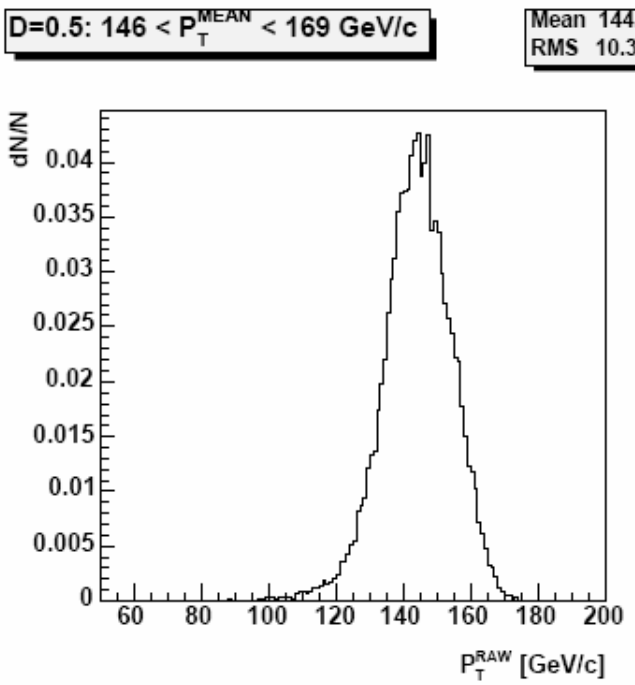


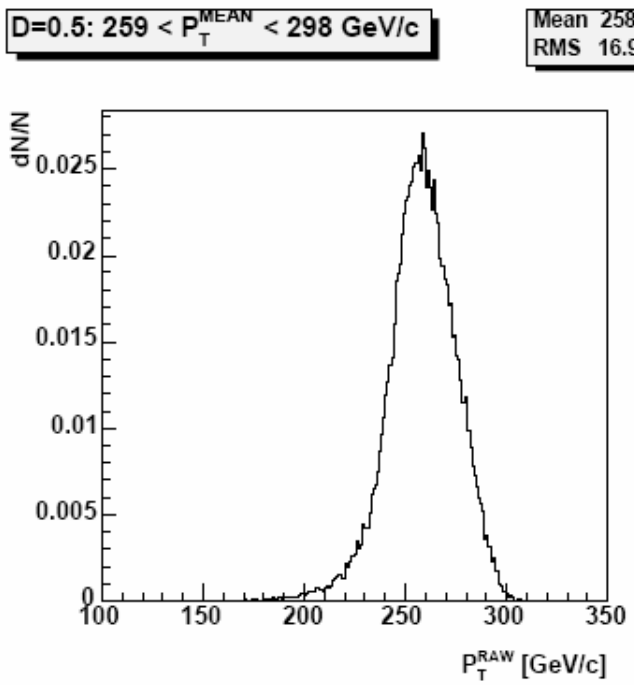
Absolute P_T jet correction: P_T^{RAW}

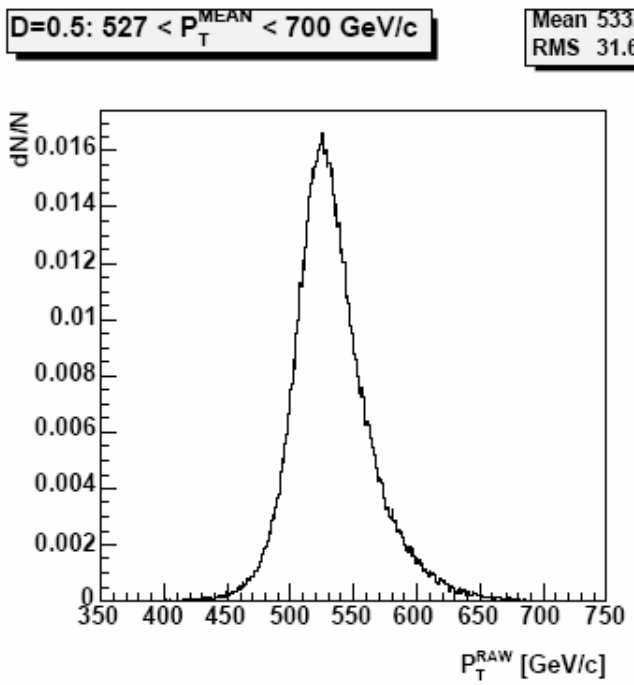




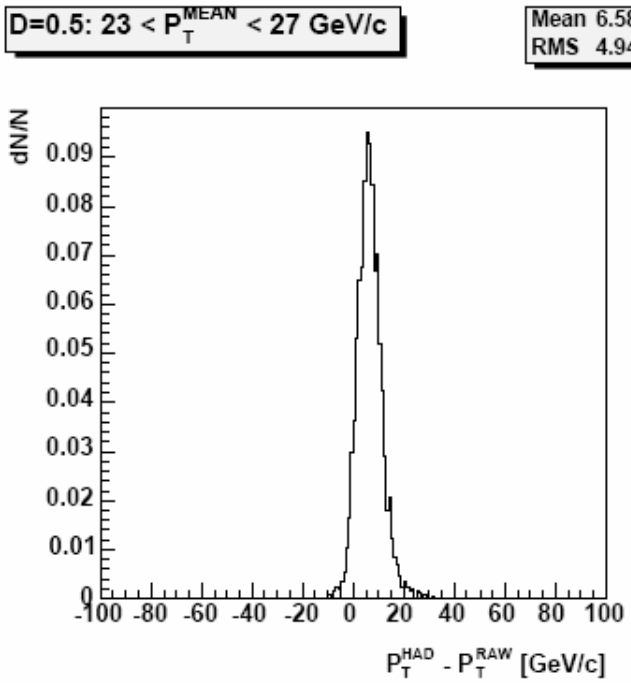


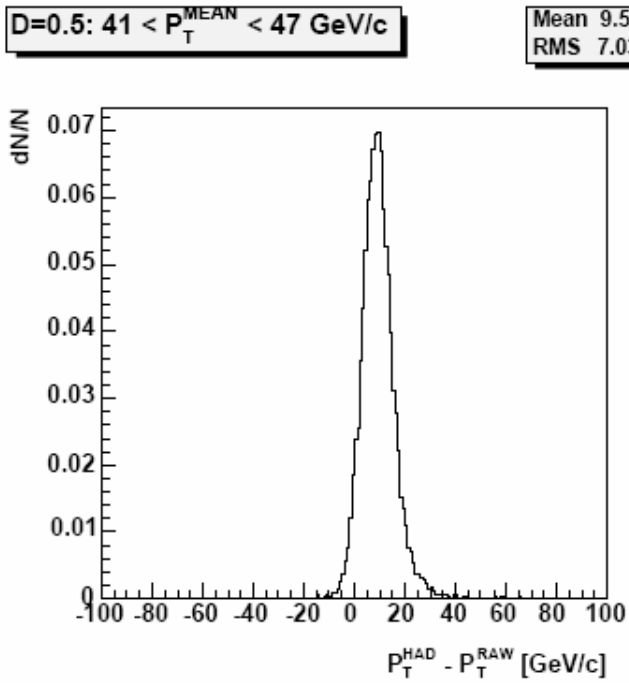


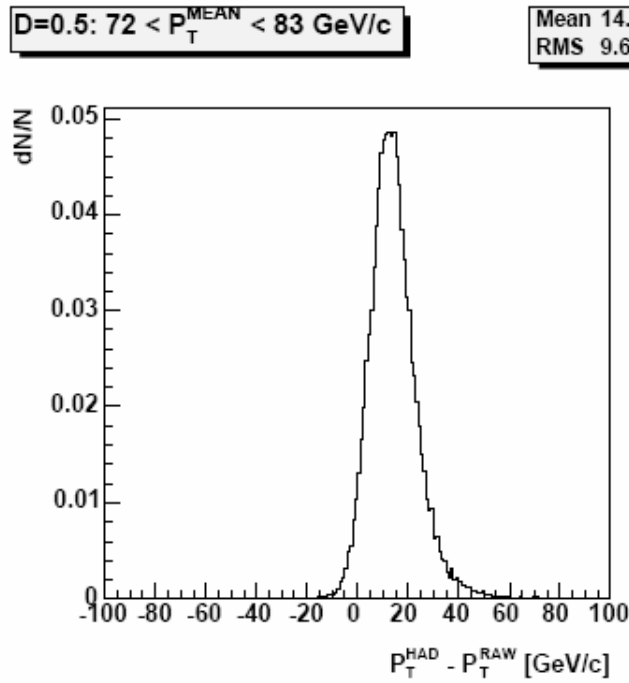


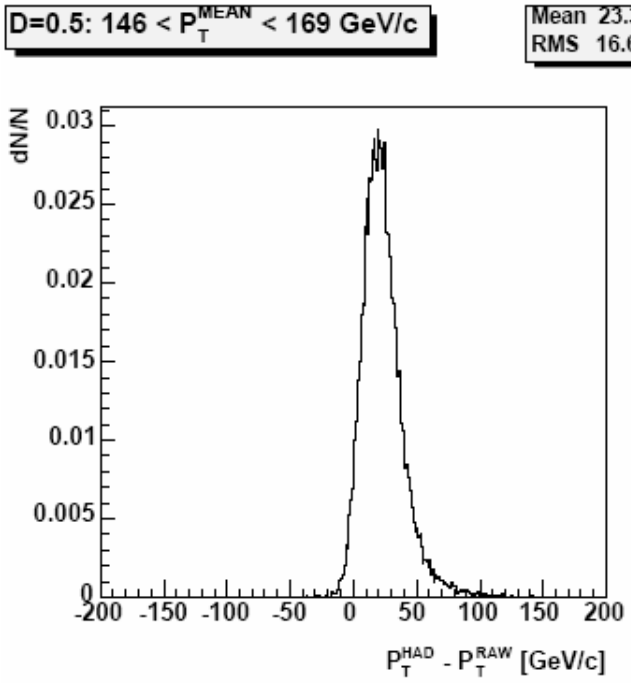


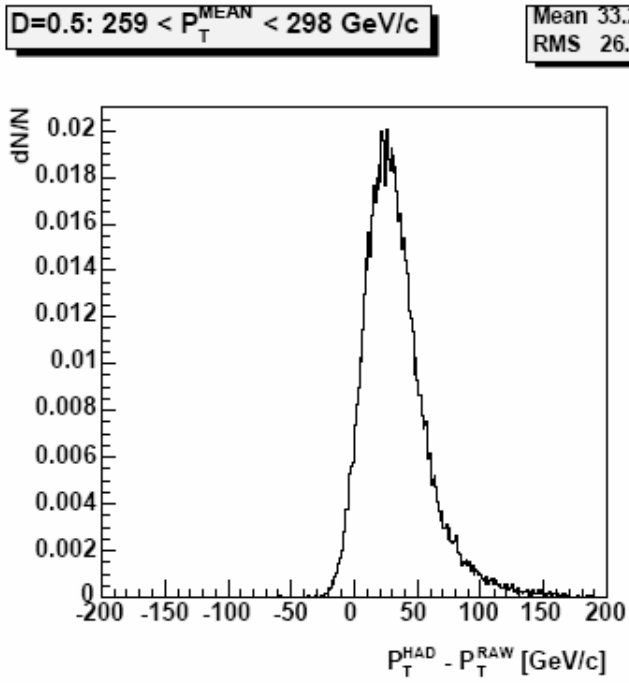
Absolute P_T jet correction: $P_T^{HAD} - P_T^{RAW}$

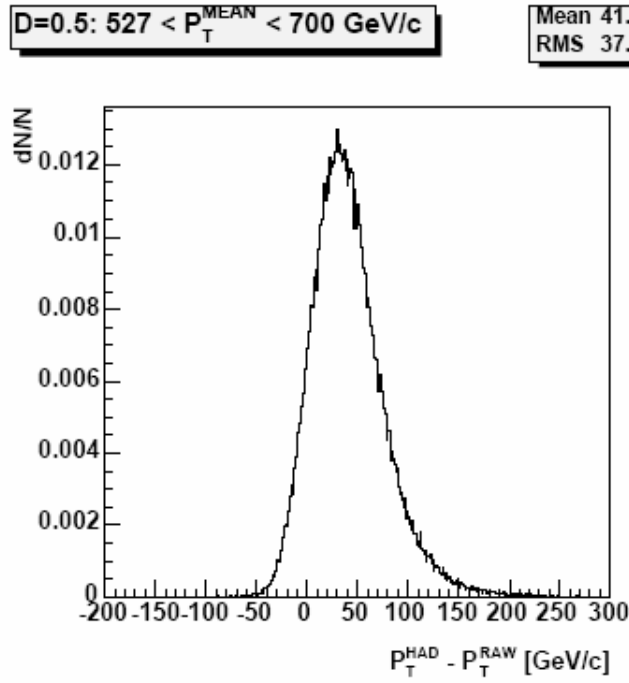




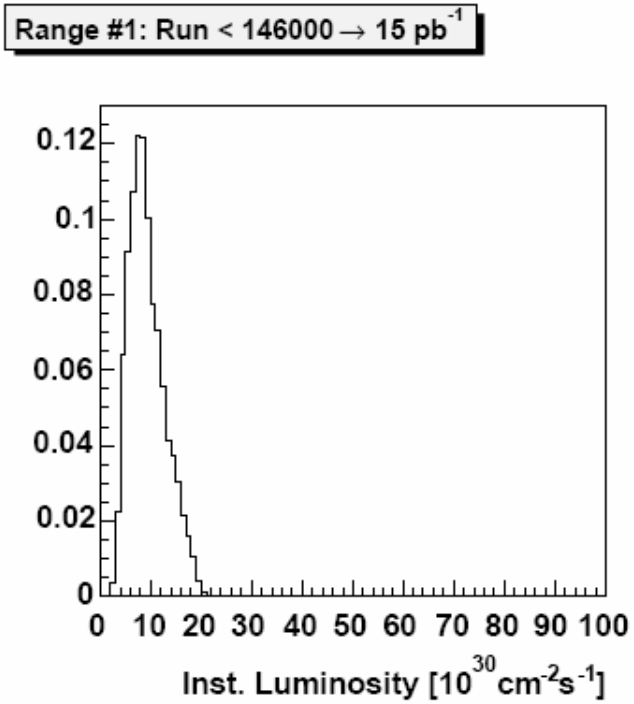


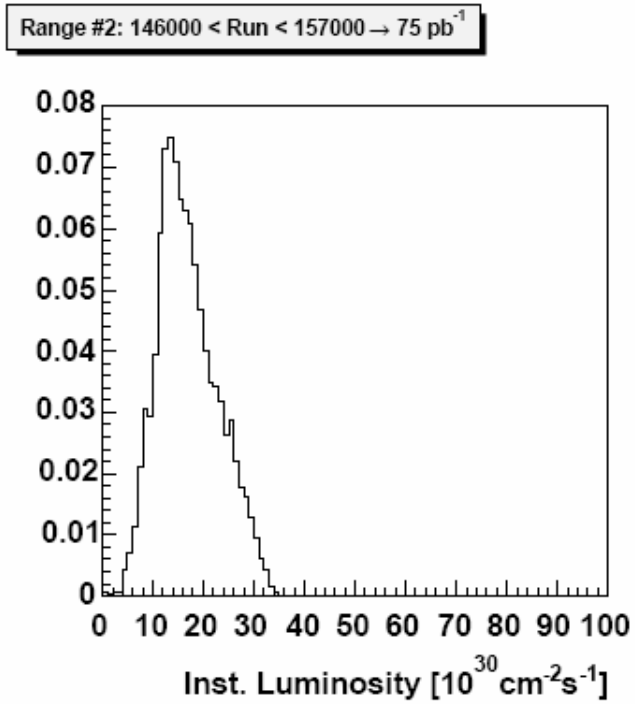


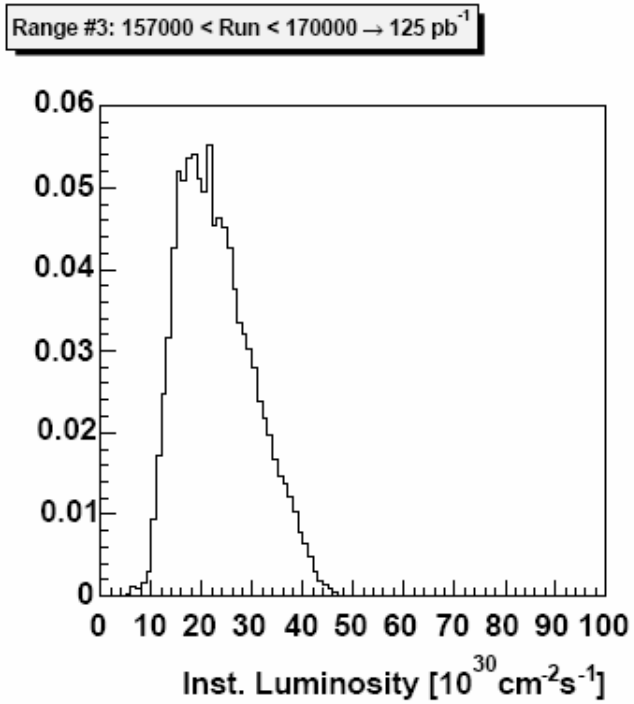


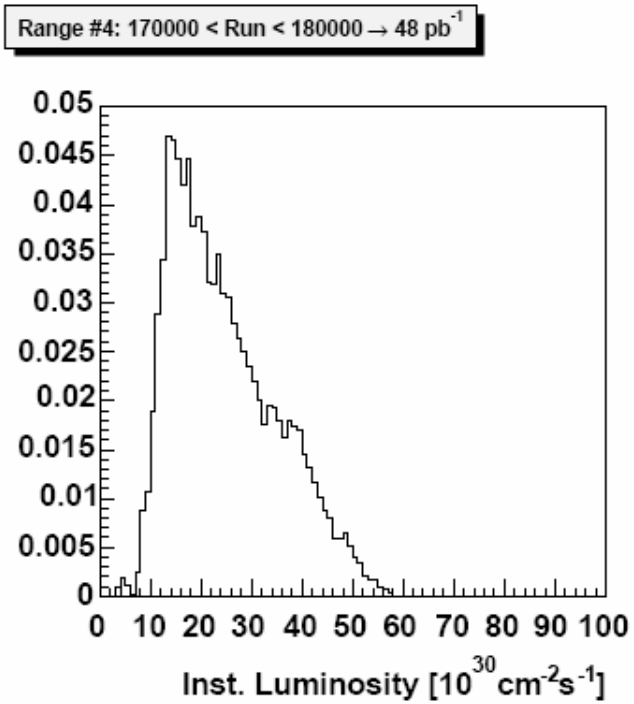


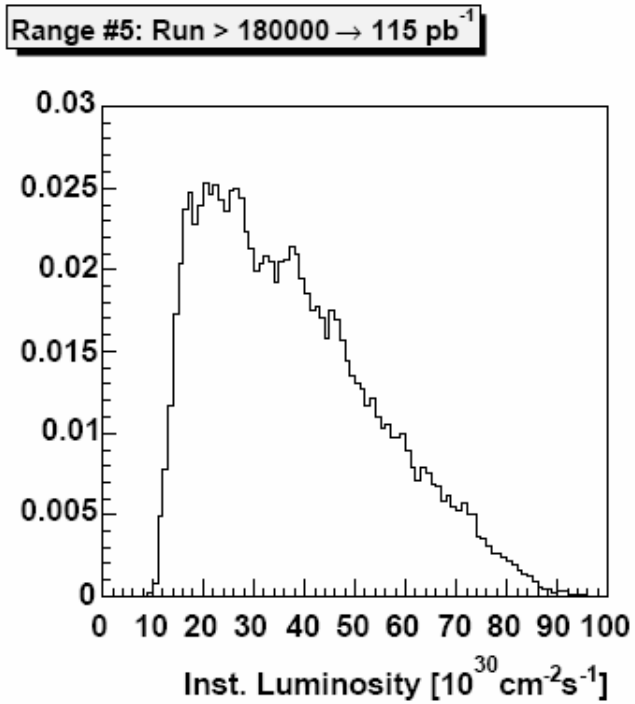
5 ≠ run ranges


Range #1: Run < 146000 → 15 pb^{-1}
0.12
0.1
0.08
0.06
0.04
0.02
0
0 10 20 30 40 50 60 70 80 90 100
Inst. Luminosity [10^{30} cm^{-2}s^{-1}]

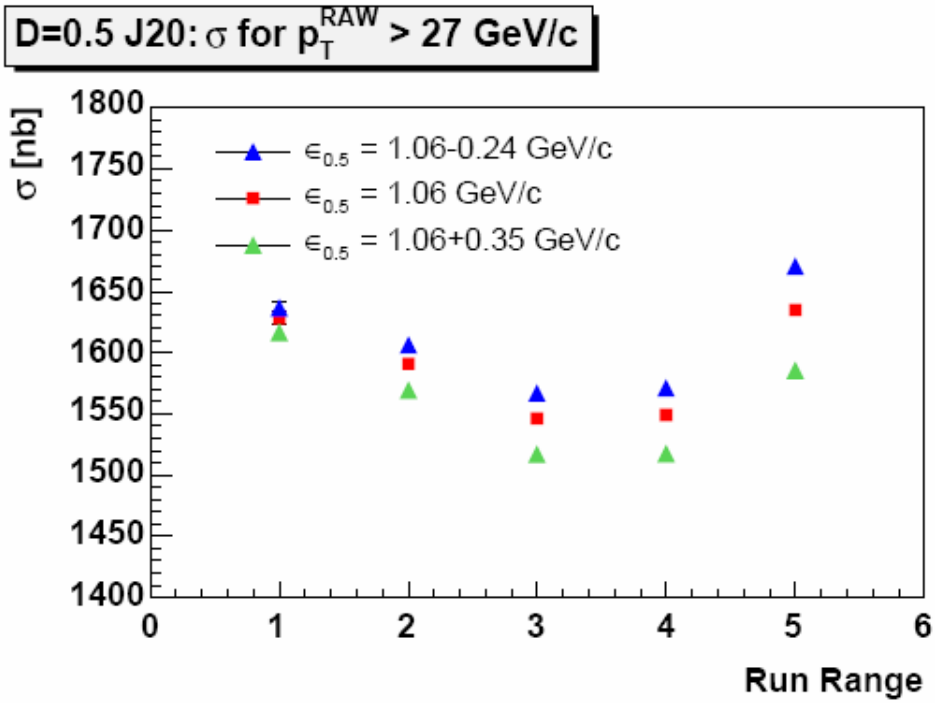

Range #2: 146000 < Run < 157000 → 75 pb^{-1}
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0 10 20 30 40 50 60 70 80 90 100
Inst. Luminosity [10^{30} cm^{-2}s^{-1}]

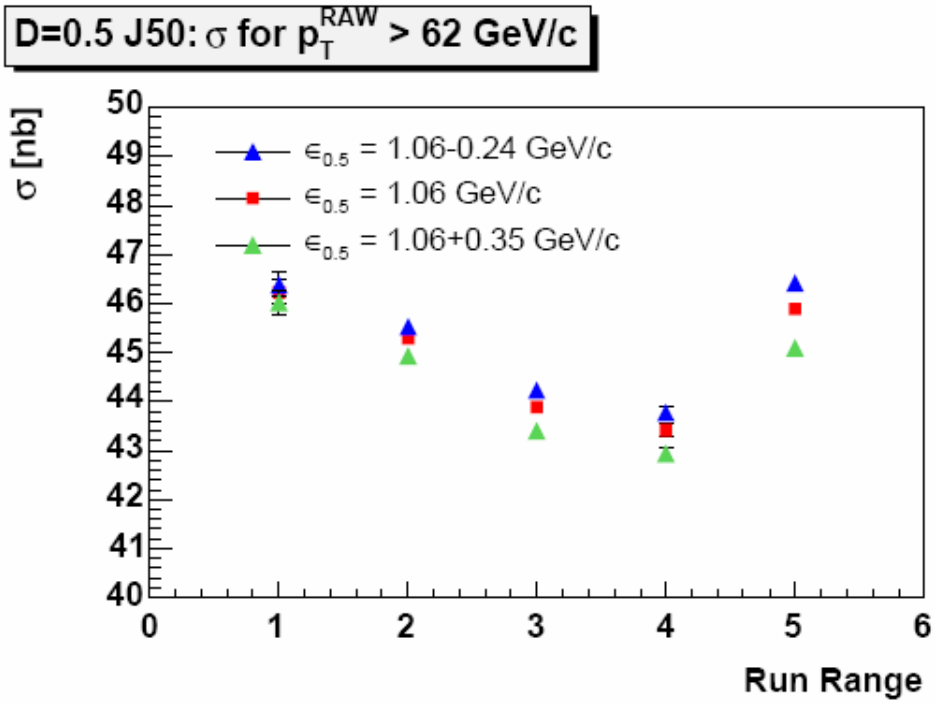

Range #3: 157000 < Run < 170000 → 125 pb^{-1}
0.06
0.05
0.04
0.03
0.02
0.01
0
0 10 20 30 40 50 60 70 80 90 100
Inst. Luminosity [10^{30} cm^{-2}s^{-1}]

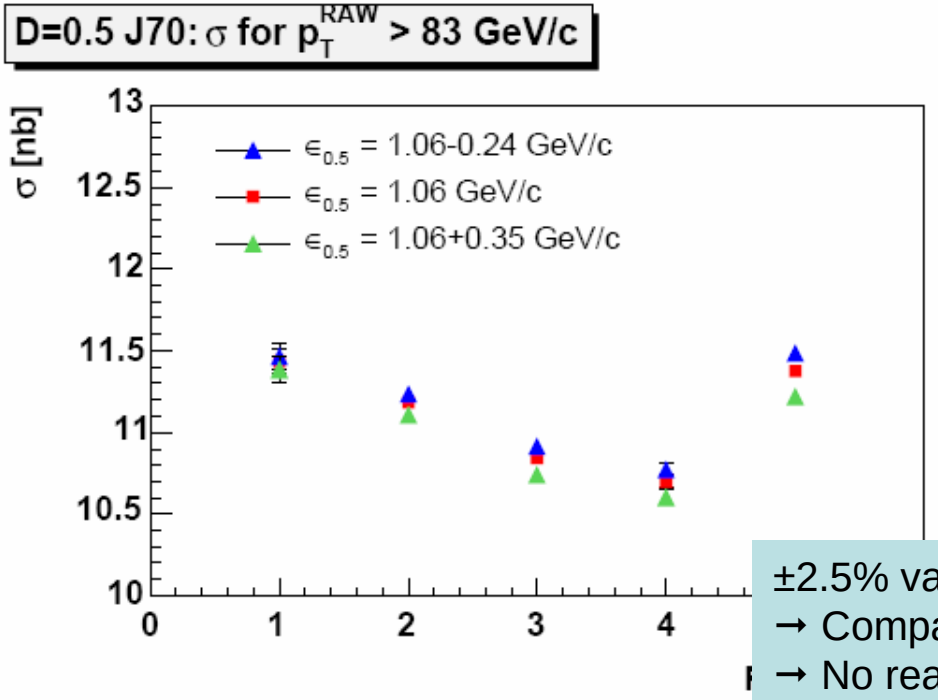

Range #4: 170000 < Run < 180000 → 48 pb^{-1}
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
0 10 20 30 40 50 60 70 80 90 100
Inst. Luminosity [10^{30} cm^{-2}s^{-1}]

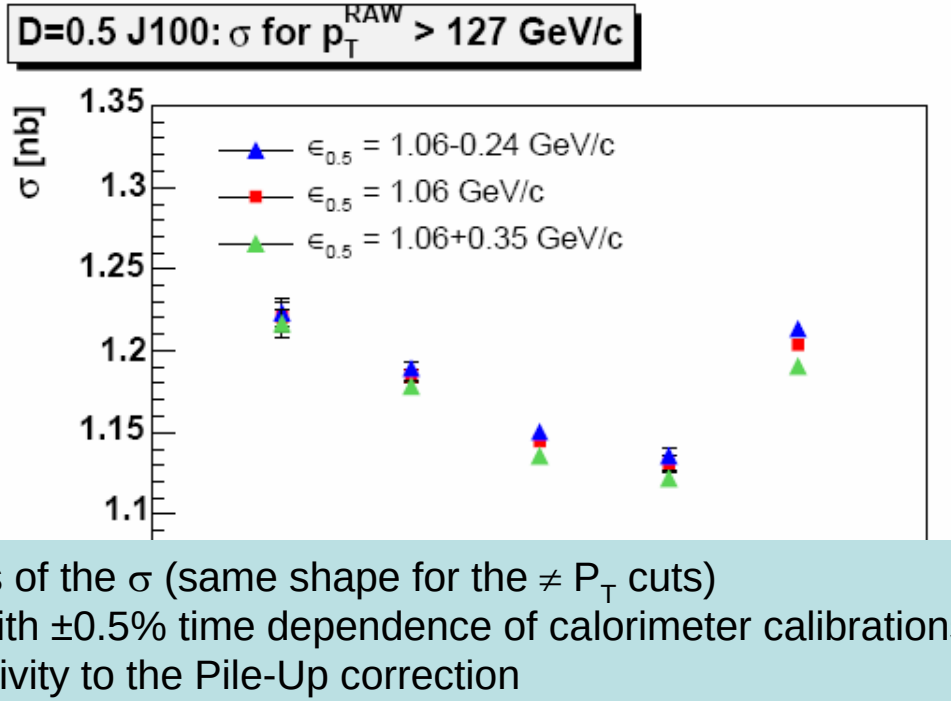

Range #5: Run > 180000 → 115 pb^{-1}
0.03
0.025
0.02
0.015
0.01
0.005
0
0 10 20 30 40 50 60 70 80 90 100
Inst. Luminosity [10^{30} cm^{-2}s^{-1}]

σ vs run ranges

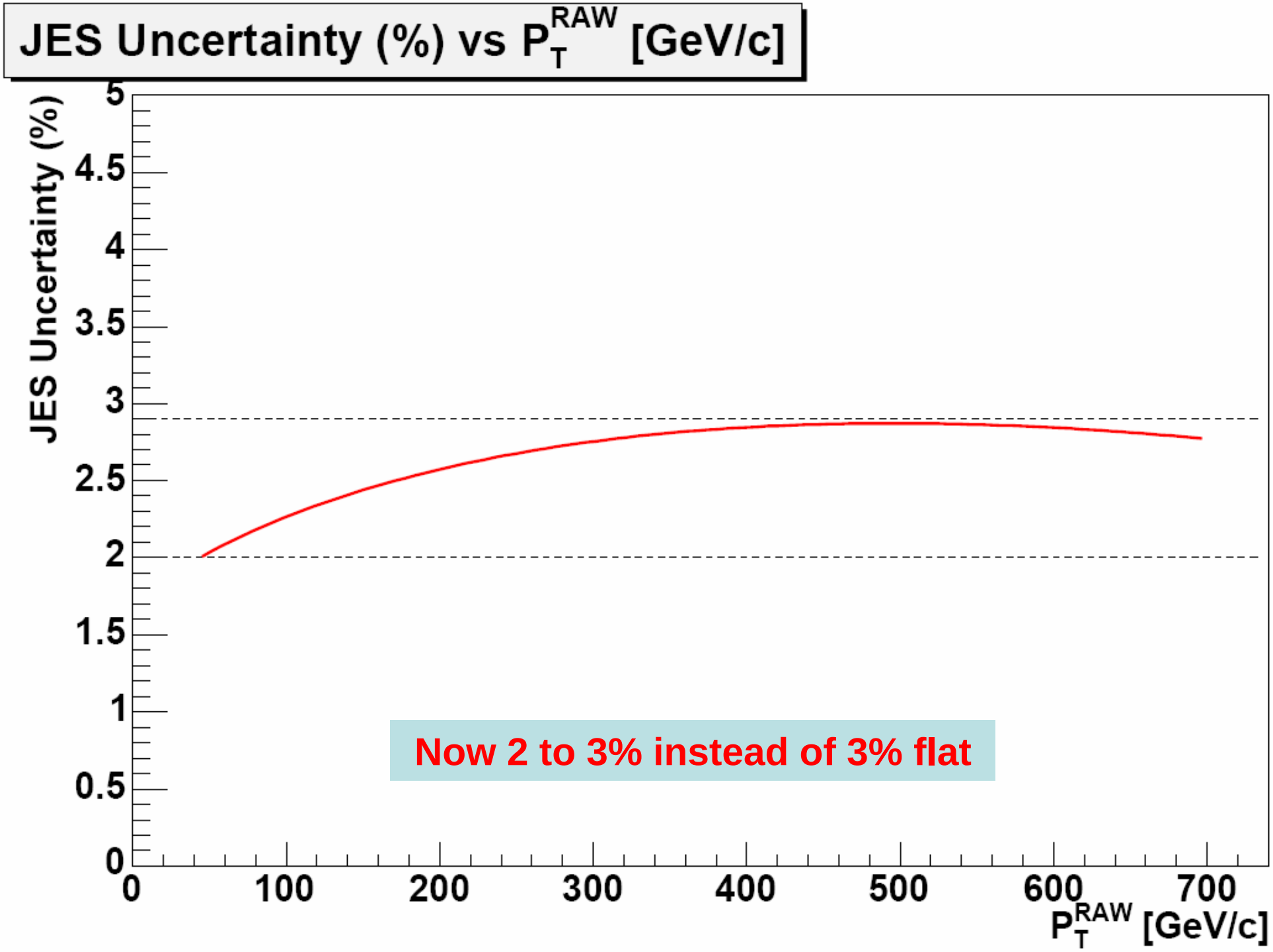








±2.5% variations of the σ (same shape for the ≠ P_T cuts)
→ Compatible with ±0.5% time dependence of calorimeter calibrations
→ No real sensitivity to the Pile-Up correction


JES Uncertainty (%) vs P_T^{RAW} [GeV/c]
JES Uncertainty (%)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
100
200
300
400
500
600
700
P_T^{RAW} [GeV/c]
Now 2 to 3% instead of 3% flat

Missing E_T scale uncertainty